

# AAI AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING  
ENGINEERING • PRODUCTION • MANAGEMENT

OCTOBER 15, 1956

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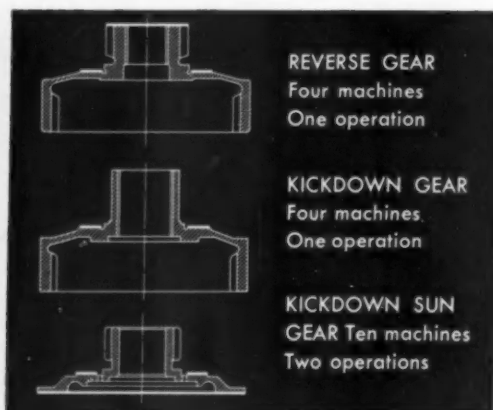
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A CHILTON PUBLICATION

**Heald *VERSATILITY*  
in action**

# How **STANDARD** Rotary Surface Grinders do a **PRODUCTION-LINE JOB**

**Eighteen Model 261s  
surface grind 3 different  
automatic transmission parts  
on a high-production basis**



**P**RODUCTION-LINE speed and tool-room precision go hand-in-hand on a Heald Model 261 Rotary. Its automatic features make it an ideal machine for long runs of identical parts. This is well illustrated by an 18-unit lineup of 261s in a fast-moving production line at a large automatic transmission plant. These *standard machines* are surface grinding the three different gears shown at the left. All 18 machines have 12" chucks and magnetic workholding is used for all but one of the operations. The number of machines used for each operation depends on grinding time per part and required hourly production. There are 15 other Model 261s in this same plant, doing both *production-line* and *tool-room* work.

Available as either a Plain or Automatic cycle machine, the Heald 261 easily meets every requirement for long or short run rotary surface grinding work. For complete information, send for Bulletin No. 2-261-2, Issue 3.

*It PAYS to come to Heald.*

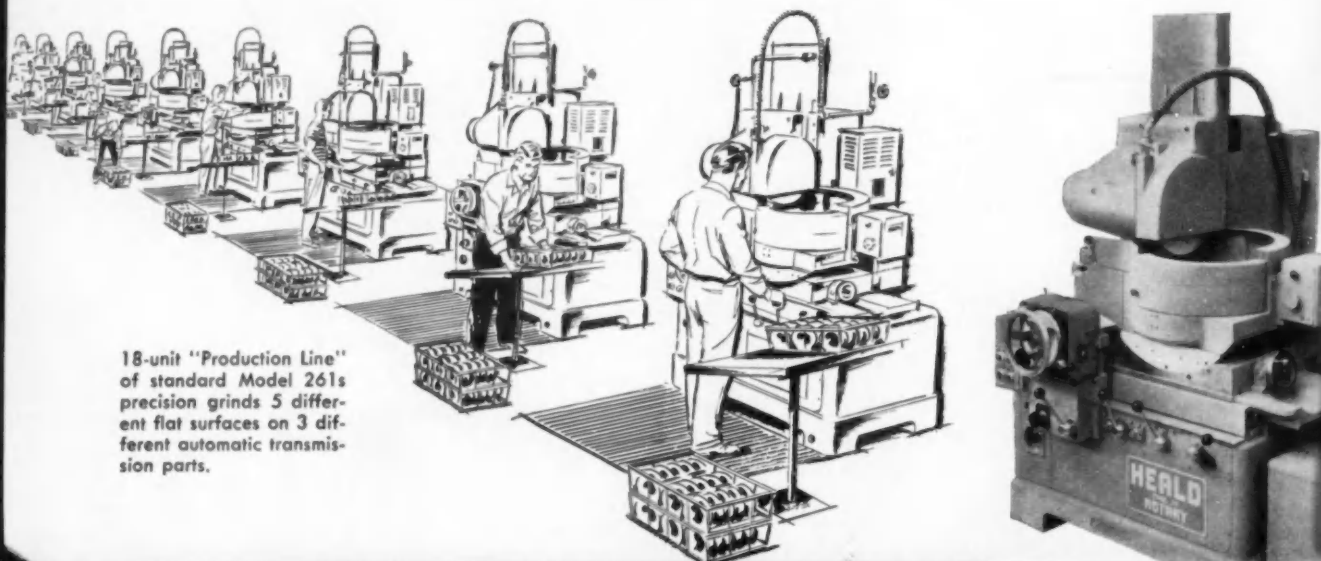


**THE HEALD MACHINE COMPANY**

Subsidiary of The Cincinnati Milling Machine Co.

**Worcester 6, Massachusetts**

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York



18-unit "Production Line" of standard Model 261s precision grinds 5 different flat surfaces on 3 different automatic transmission parts.

Truck powered by Waukesha WAKR (Butane).



for  
**HEAVY**  
hauling

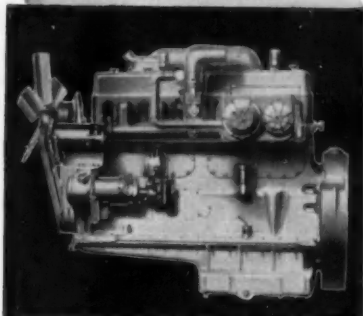
# WAUKESHA

1197 CUBIC INCH

## Extra Heavy Duty ENGINES

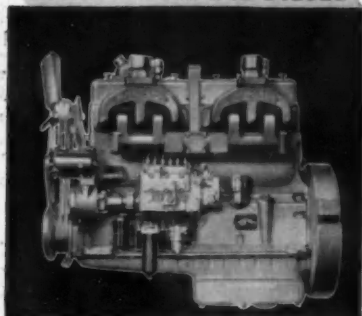
Up to 352 max. hp, all with counterbalanced crankshafts

### WAKR BUTANE



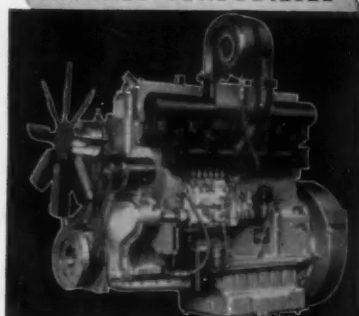
**WAKR Butane**—six cylinders, 6¼-in. bore x 6½-in. stroke, 1197 cu. in. displacement, 290 hp at 1800 rpm.

### WAKDB NORMAL DIESEL



**WAKDB Normal Diesel**—six cylinders, 6¼-in. bore x 6½-in. stroke, 1197 cu. in. displacement, 258 hp at 1800 rpm.

### WAKDBS TURBODIESEL



**WAKDBS Turbocharged Diesel**—six cylinders, 6¼-in. bore x 6½-in. stroke, 1197 cu. in. displacement, 352 hp at 1800 rpm.

Write for descriptive bulletins

313



WAUKESHA MOTOR COMPANY • WAUKESHA, WIS.

NEW YORK

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LOS ANGELES



## INCO RESEARCH OFFERS HELP

(Left) One phase of the search for answers to high temperature questions is the continuing work on new INCO Nickel Alloys. Here INCO metallurgists pour an experimental melt from their laboratory radio-frequency induction furnace. The resulting alloy may be a new solution to some of the unanswered high temperature problems facing engineers today.



**BLISTERING**



**SHEAR CRACKING**



**FLAKING OR SPALLING**

Breakdown of oxides by blistering, cracking or spalling can cause rapid destruction. As the oxide layer breaks away, it keeps exposing fresh metal to further attack until its strength is wasted away. This type of failure can be avoided by using an alloy that resists the corrosive action at high temperature and protects itself with a tough adherent oxide.

# What causes high temperature failure?

Strange reactions can take place when metals are exposed to high heat.

Even common soot and the air itself become destructive corrosives that can disintegrate a metal and waste away its strength.

### High Temperature Corrosion

The more these reactions are studied, the more evident it becomes that the damage caused by high temperature corrosion is one of the most serious reasons for metal failures.

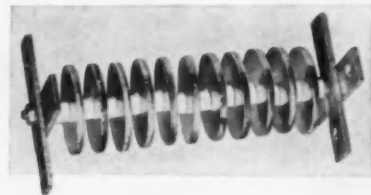
No single metal or alloy can resist all these corrosive conditions. For 20 years Inco metallurgists have been experimenting with controlled compositions of metals . . . searching for the answers to the problems posed by expanding temperature frontiers. From this work have come such strong, heat-

resisting alloys as Inconel and Inconel "X," Incoloy and the Nimonic Alloys.

### Have metals reached their limit?

Inco metallurgists think not. Who knows what future research programs may reveal?

Do you have a problem involving high temperatures? The solution may already be in the files of Inco's High Temperature Engineering Service. If not, our engineers will be glad to work with you to find it. Write for a "High Temperature Work Sheet" to help you outline your problem for study. After that it is up to us. There is no obligation on your part.



Which of these metals will solve your problem? When INCO's High Temperature Engineers do not have a ready answer in all their amassed information, they make use of a test rack like this. After exposure to high temperature corrosion under actual service conditions, a direct comparison of the different samples indicates which metal or alloy may solve your particular problem.



**Nickel Alloys Perform Better Longer**  
**THE INTERNATIONAL NICKEL COMPANY, INC.**

67 Wall Street

New York 5, N. Y.

# AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE PUBLISHED SEMI-MONTHLY

OCTOBER 15, 1956

VOL. 115, NO. 8

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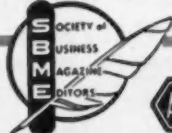
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# Performance Records Prove Eaton Free-Valves DO Last Longer!



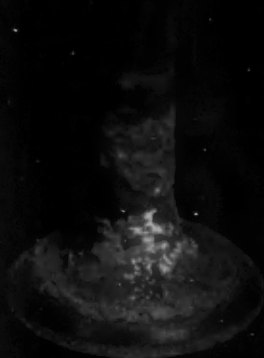
## CONVENTIONAL VALVES

Failure unpredictable—anywhere between 5,000 and 40,000 miles. Impossible to set up dependable preventative maintenance schedule.



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Our engineers will be glad to explain how Eaton Free-Valves can be applied to engines of all types and sizes.

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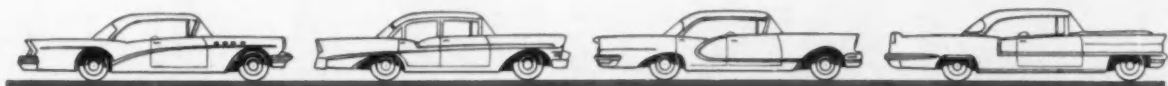
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Automotive Industries, October 15, 1956

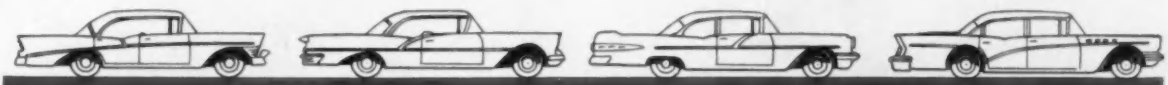
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trucks built today have  
**HYATT Hy-Roll Tapers . . .**



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**taper roller bearings**



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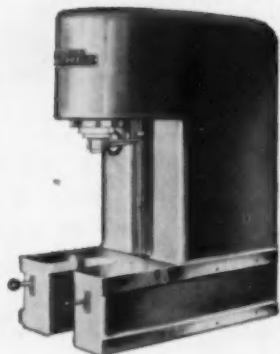
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## NOW-3 new developments in axial face sealing for rotating shafts

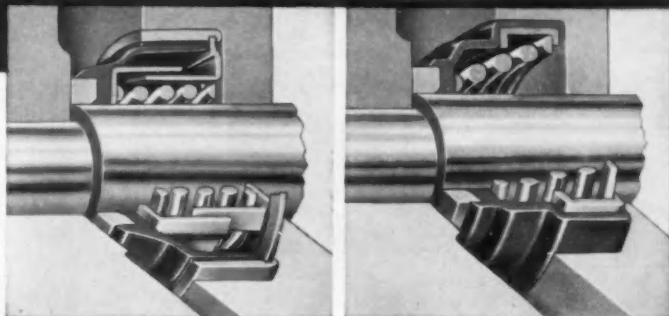
### **VICTOR** **VICTO-SEAL** AXIAL FACE SEALS

#### **Victo-Seal Type 2**

Highly effective for rotating shaft applications on shallow well pumps, rotary compressors, etc. Utilizes stationary mating seal ring; also can seal against end plate with proper finish.

#### **Victo-Seal Type 3**

End face seal unit with metal O.D. for sealing against suitably finished mating surface. For press fit applications in pumps, machine tool applications, automotive equipment, etc., on shaft diameters of .312 to 1.000 in.



Now—water pumps and household appliances, automotive and other industrial equipment for handling fluids can all be sealed more securely and dependably than ever before.

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Victo-Seal incorporates the latest thinking in axial face shaft seal engineering. With the NEW positive torque lock, it eliminates diaphragm fatigue and maintains constant unitary function. Victo-Seal is self-aligning; it compensates automatically for wear, shaft movement and insulates against vibration. Its long-life compression spring provides controlled pressure contact between sealing surfaces.

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Literature available through your Victor Field Engineer, or on request to: Victor Mfg. & Gasket Co., P. O. Box 1333, Chicago 90, Ill. In Canada: Victor Mfg. & Gasket Co. of Canada Ltd., St. Thomas, Ont.

#### **Victo-Seal Type 6**

A highly economical end face seal with Victoprene outside diameter assures ease of installation and removal. Metal parts are completely encased in and seal ring bonded to Victoprene diaphragm. Extensively used in the appliance industry.



# **VICTOR**

Sealing Products Exclusively

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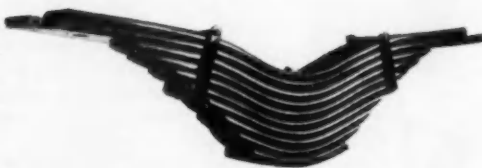
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**REALLY HEAVY!**



**M**ACK trucks include some of the largest in the industry . . . designed to carry tremendous loads which impose heavy responsibilities on every structural member . . . body . . . frame . . . chassis . . . and especially the springs.

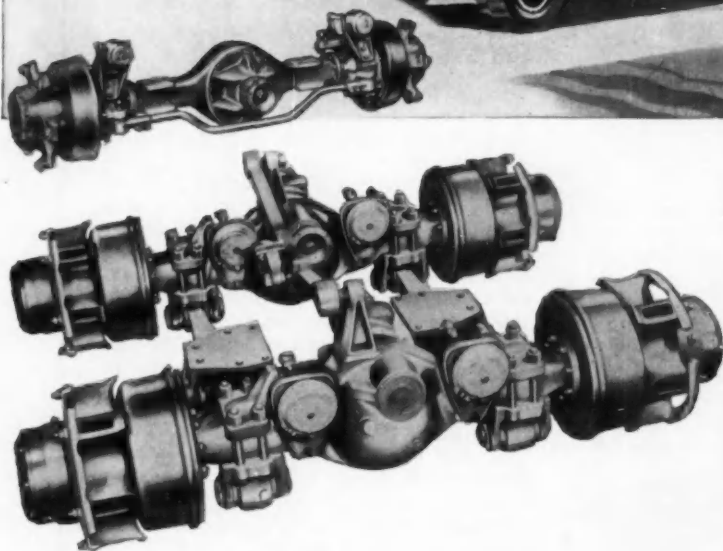
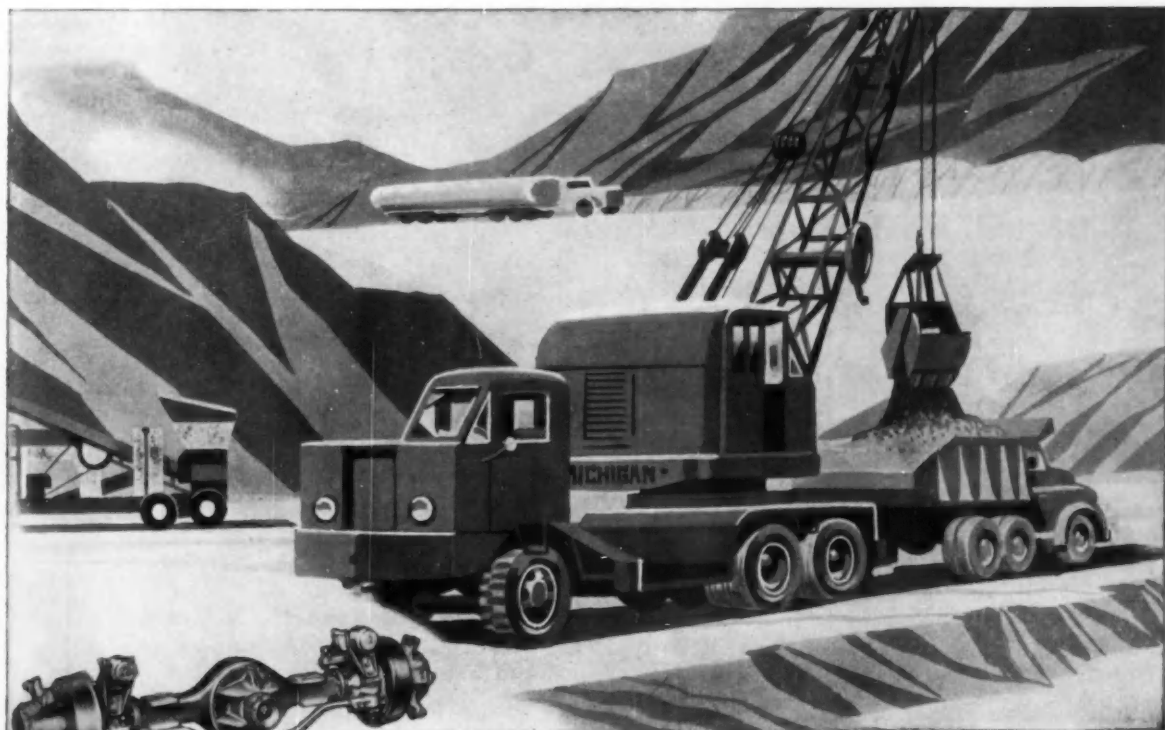
As one of the suppliers of springs for Mack trucks, BURTON has proved equal to the extreme requirements of these famous heavy duty vehicles. Here, the highest degree of dependability is an essential quality . . . for the performance of the springs profoundly influences that of the entire vehicle.

You are invited to follow the example of America's foremost truck and trailer manufacturers by bringing your spring requirements to the attention of Burton's engineering staff.



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... Vital Support for the Automotive Industry ...

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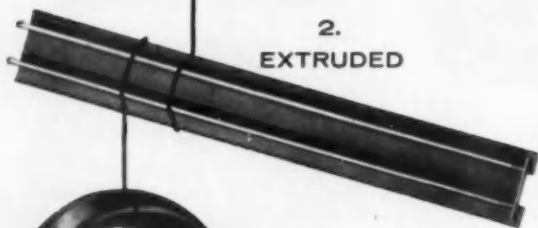
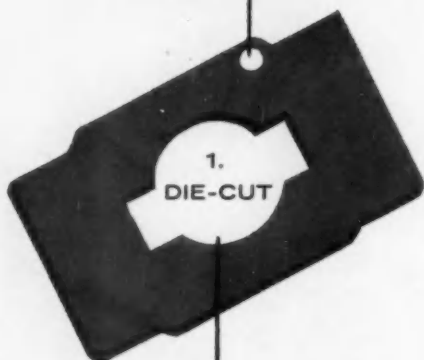
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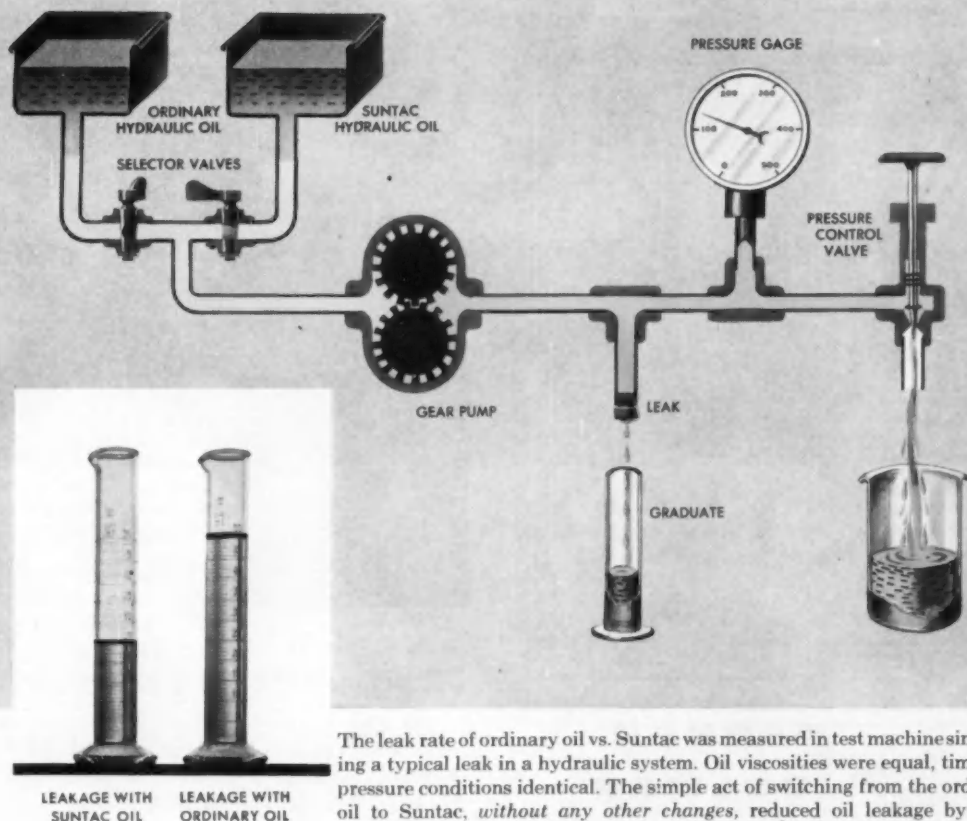
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*precision reaming* **CUTS HOLE FINISHING COSTS**

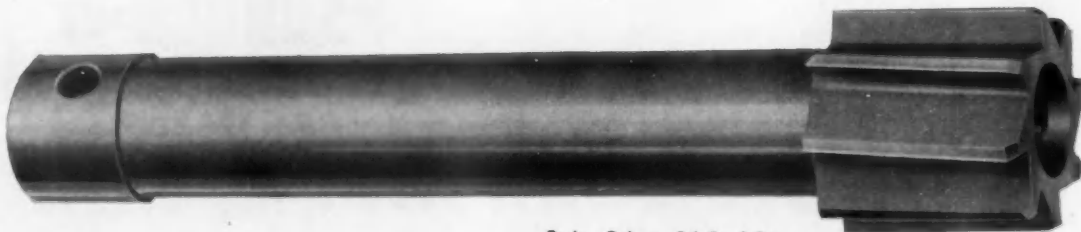


**BARBER-  
COLMAN  
offers**

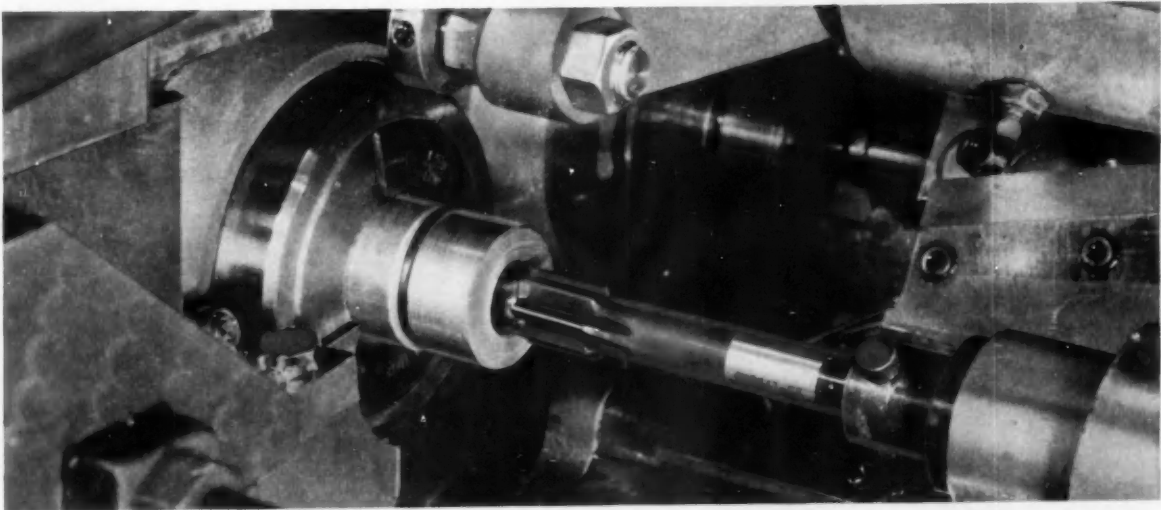
*Close control of size and finish*  
*Consistent duplication of accuracy*  
*Minimum finishing stock*  
*Fewer finishing operations*

Important job economies are being obtained in hole finishing operations with Barber-Colman standard "oil feed" reamers. Close control of size and finish reduces the number of finishing operations required and results in shorter finishing time. Because reamer diameters are held to a tolerance of  $+.0002''$ ,  $-.0000''$ , reamers can be drawn from stock and put to work immediately on the machines, with assurance of consistent hole accuracy. This eliminates the usual machine downtime for hand working the reamers and size checking.

Through careful tool design and accurate sharpening, reamers are made to suit the specific job characteristics, so that better cutting action produces fewer stresses, and



Barber-Colman Oil Feed Reamer



consequently less distortion in heat treating. As a result, less finishing stock is required for honing after hardening.

Cost savings benefits such as these are evidenced in the Barber-Colman "oil feed" reamers used to size bores in planetary gear blanks. Blank bores are finished within .7536"/.7543" I.D. to 15-60 rms. Since reaming produces blanks within the close tolerances required for accurately cutting the gear teeth, a series of successive finishing operations formerly required have been eliminated, greatly reducing cost per finished hole. Minimum stresses produced as a result of reaming confine heat treating distortion to normal shrinkage of the hole. Consequently, in this case, the hole is reamed to final size, and it is only necessary for honing to remove the amount of shrinkage. The job facts as shown illustrate the production accuracy and finish obtained:

Barber-Colman reamer design produces sharp cutting edges with positive primary clearance on the land, rather than a cylindrical land, to provide a shearing action cut. These sharp edges with irregular flute spacing produce smooth cutting with uniform finish and accuracy which cannot be obtained with conventional reamers. These reamers also have a slight right hand helical flute with

an oil hole drilled through the center of the reamer so that the cutting oil will force the chips back between the flutes, contributing to fine finish.

Semi-Finished Bore Diameter	.7536"/.7543"
Maximum Taper Allowable	.0001"
Bore Square and Parallel with Face of Blank	.0003"/.0005"
Concentricity with O.D.	.002"
Production	200 Blanks per Hour
Cutting Time	17 Seconds
Cutting Speed	302 rpm.
Stock Reamed	.008" to .009"
Finish	15-60 rms.
Bore Depth	.820"
Feed	.025"

When you have hole finishing problems involving close limits of accuracy and a series of operations, call a Barber-Colman reaming expert and talk over with him the most economical way to get the finish and accuracy you want. You will find substantial production savings possible, both in cost and time.

## BARBER-COLMAN COMPANY

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Hobs • Cutters • Reamers • Hobbing Machines • Hob Sharpening Machines



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ADJUSTABLE  
BALLJET  
SPINDLE KIT  
1" TO 3"



ADJUSTABLE  
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 $\frac{1}{16}$ " TO 12"

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The Adjustable Airsnap and Precisionaire shown, provide the absolute dependability of high-amplification air gaging which tells the operator exactly what he is doing all the time—prevents scrap.

At the same time, there is no cost penalty for single-purpose air gage tooling. This Airsnap is adjustable. It can be used just as effectively on the next job providing the new gaged diameter falls within the adjustment range—in this case, one inch.

Adjustable air gage tooling is available for the inspection of internal dimensions from  $\frac{1}{32}$ " to 12"—for external dimensions up to 36". Write The Sheffield Corporation, Dayton 1, Ohio, U.S.A., Dept 4.



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manufacture and measurement for mankind

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Check with Sheffield on the many savings of  
Adjustable Air Gage Tooling.

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# Transmission Repairs only .0003¢ ( $\frac{3}{10}$ mill) per mile at SUPER SERVICE

**after an average of 210,176 miles on each of  
172 Fuller Transmissions**

"With the Fuller ROADRANGERS in our fleet, we've hit an all-time low in transmission repair costs," says Ray Carter, Director of Engineering for Super Service Motor Freight Co., Nashville, Tennessee.

Super Service recently completed a careful check of maintenance records for 172 White tractors equipped with Fuller 10-speed Semi-Automatic ROADRANGER Transmissions. With an average of 210,176 miles per tractor, company records showed a remarkable average repair cost of *only .0003¢ (3/10 of a mill) per mile for*

### *each ROADRANGER Transmission!*

About two years ago, Super Service standardized its entire over-the-road fleet on White tractors equipped with ROADRANGER Transmissions and Cummins diesel engines. From that time on, old performance records began to fall.

Operating from the South to the East . . . with terminals from Nashville to New York . . . the ROADRANGER equipped tractors pull square nose, 35-foot aluminum trailers that average 52,500 lbs. gross tare weight. The tractors now cut a

full hour off the old 10-hour trip time on the Nashville-East run . . . taking rugged Tennessee hills at 35 miles an hour when 15 was considered a good speed with the old equipment.

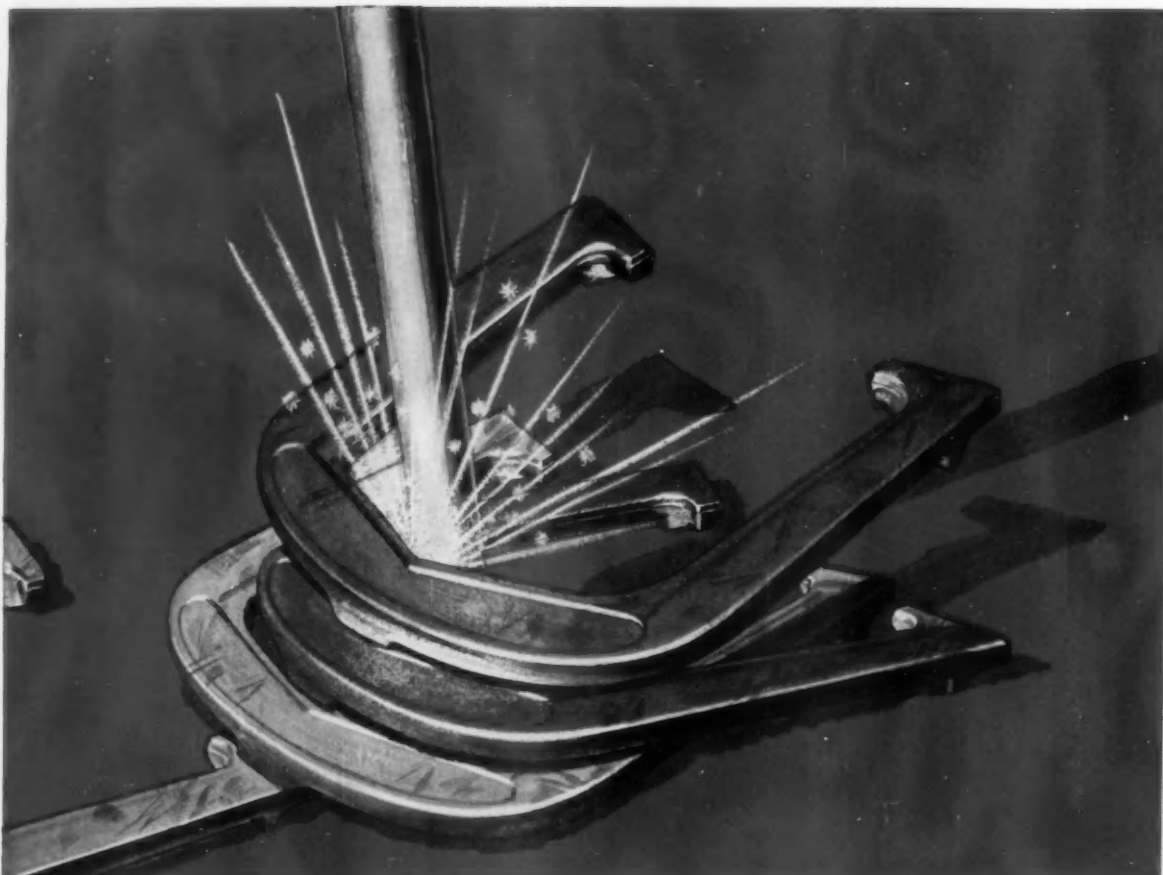
Super Service cuts running time and maintenance to a minimum by running its rigs straight through from Nashville to New York. Drivers are changed twice . . . but there's no need to warm up a cold engine at each stage of the relay.

For your fleet, get the facts on ROADRANGERS from your truck manufacturer or truck dealer now.



**FULLER MANUFACTURING COMPANY**  
TRANSMISSION DIVISION • KALAMAZOO, MICH.

Unit Drop Forge Div., Milwaukee 1, Wis. • Sholar Axle Co., Louisville, Ky. (Subsidiary) • Sales & Service, All Products, West. Dist. Branch, Oakland 6, Cal. and Southwest Dist. Office, Tulsa 3, Okla.



**"Finish first in your league"**

**...with J&L COLD FINISHED JALCASE STEELS**

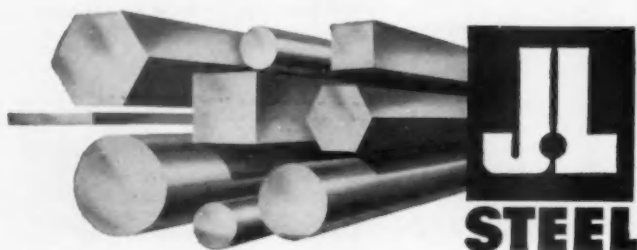
Cold Finished Jalcase—now available in 10 SAE and AISI grades—is the original free-cutting open hearth steel having the mechanical properties required for special service machined parts. And it's especially suitable for heat treating. This grade is one of a complete line of premium quality, free-machining bar steels developed over the years by J&L specialists. Thus, we can recommend the right type to help solve your particular problems.

Fundamental advantages of Jalcase are:

- Easy, consistent machinability
- Minimum distortion
- Fast, uniform response to heat treatment
- High wear resistance
- Improved cold-drawn mechanical properties

Adequate stocks are available in important industrial centers. Phone the nearest J&L District Office or your Distributor today for prompt and efficient service.

***Pick the Free-Machining Steel that serves you best—from J&L's complete Cold Finished Line***



**Jones & Laughlin**

STEEL CORPORATION • PITTSBURGH

COLD FINISHING PLANTS AT  
PITTSBURGH, PA., AND HAMMOND, IND.

Why LINK-BELT timing chains assure

# factory-engineered timing

throughout thousands of miles of car operation

Get  
All  
3

- AUTOMATIC JOINT SNUGNESS
- SMOOTHER OPERATION
- LONGER LIFE

Factory-set valve timing is closely maintained during thousands of miles of car operation with precision Link-Belt Timing Chain. Segmental bushings automatically provide for snug joints, reducing "slap" on the non-load side. And this—together with the built-in anti-back-bend feature—is Link-Belt's answer to smoother operation, long life and peak timing drive performance.

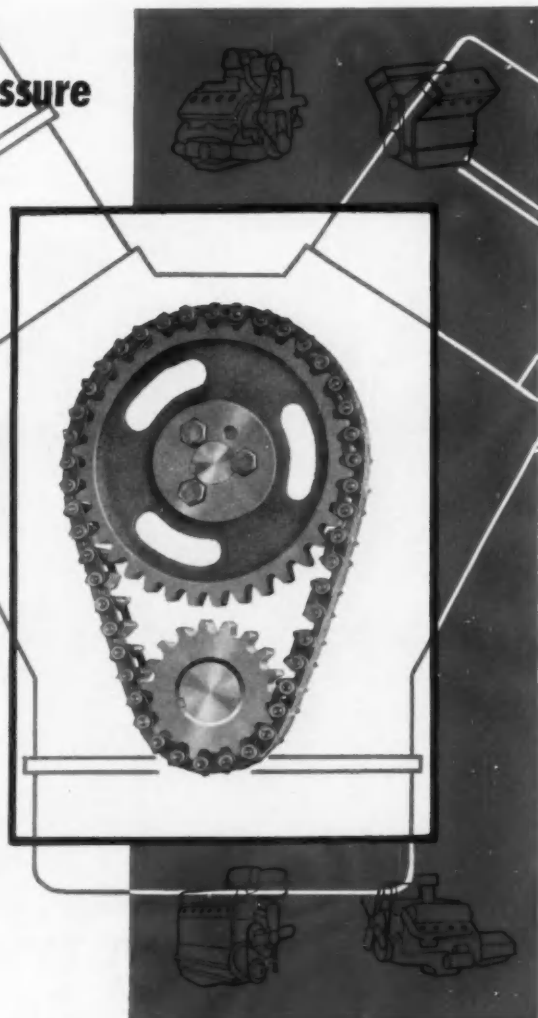
Link-Belt can call on 45 years of experience in applying timing chains to internal combustion engines. In addition, our research staff continually tests timing chains on current engines, working with modern facilities similar to those of your own engine designing laboratories. As a result, Link-Belt is thoroughly prepared to furnish a test drive and work with you in applying it to your design.

Specifications and information for layout work, etc., are contained in Book 2065. Write for your copy.



TIMING CHAINS AND SPROCKETS

LINK-BELT COMPANY, 220 South Belmont Ave., Indianapolis 6, Ind.



Segmental bushings provide automatic joint snugness



Segmental bushings are made with slight bow.



After initial assembly in chain, bushings are straight.



Bow in bushings acts to keep a snug joint on non-load side, maintaining chain pitch automatically.

**ANOTHER LINK-BELT EXCLUSIVE**—Built-in check in joints allows forward articulation for engagement with sprockets . . . prevents back-bend and whip.



Typical tire distortion caused by high-speed turn. Tougher, stronger nylon cord tires resist damage from such everyday punishment.

## THERE'S EXTRA SAFETY IN NYLON CORD TIRES

*Du Pont produces the nylon fiber.  
Tire manufacturers make nylon cord tires  
—in tubeless or conventional types.*

Tires are among the components that can help make today's fine cars even safer. For our roads—whether superhighway or city street—are traveled to a point that tire failure of *any* kind is a potential danger.

- Nylon cord tires offer utmost safety, surest protection against tire trouble. Nylon tires have proved their superiority on military and commercial planes and on heavy-duty trucks. The people whose lives and livelihood depend on the ability of cars to perform at high speeds rely on nylon tires. Turnpike police, professional auto racers and high-speed test drivers are examples.

- Nylon cord tires reduce unsprung weight, and they readily absorb the added strains of power steering, braking, and higher horsepower.

- Nylon cord tires are among the components which contribute importantly to motor-car safety. They are the coming standard of the industry. As original equipment, they provide a valuable sales feature—extra safety.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY





Because these solenoid covers are essential to valve operation, they are chained to the valves. Also, they fasten with 4 "captive" screws that cannot be mislaid. A manual operating button makes it possible to operate the valve without removing its cover.

Now! solenoid-controlled air valves  
that defy improper maintenance  
...they won't operate with their covers off!

When a solenoid valve operates without its cover, trouble is not far off. Dirt, oil, cutting fluid, chips are sure sooner or later to jam the solenoid, and the valve will fail to shift.

**That can't happen with these new Hannifin valves!**

The solenoids are held in place by their covers and won't operate the valves unless the dust-tight, splashproof covers are firmly tightened.

These new valves, which conform to the latest J.I.C. recommendations, are part of the complete "P-M" Pilot-Master line. New heads with these new solenoid covers are offered on 2-way, 3-way and 4-way Pilot-Master Valves (air-operated). The smaller, direct-operated 3-way and 4-way valves in the "P-M" line have been redesigned to use the same new covers. This added feature is just another reason why it pays to standardize on Hannifin air control valves.

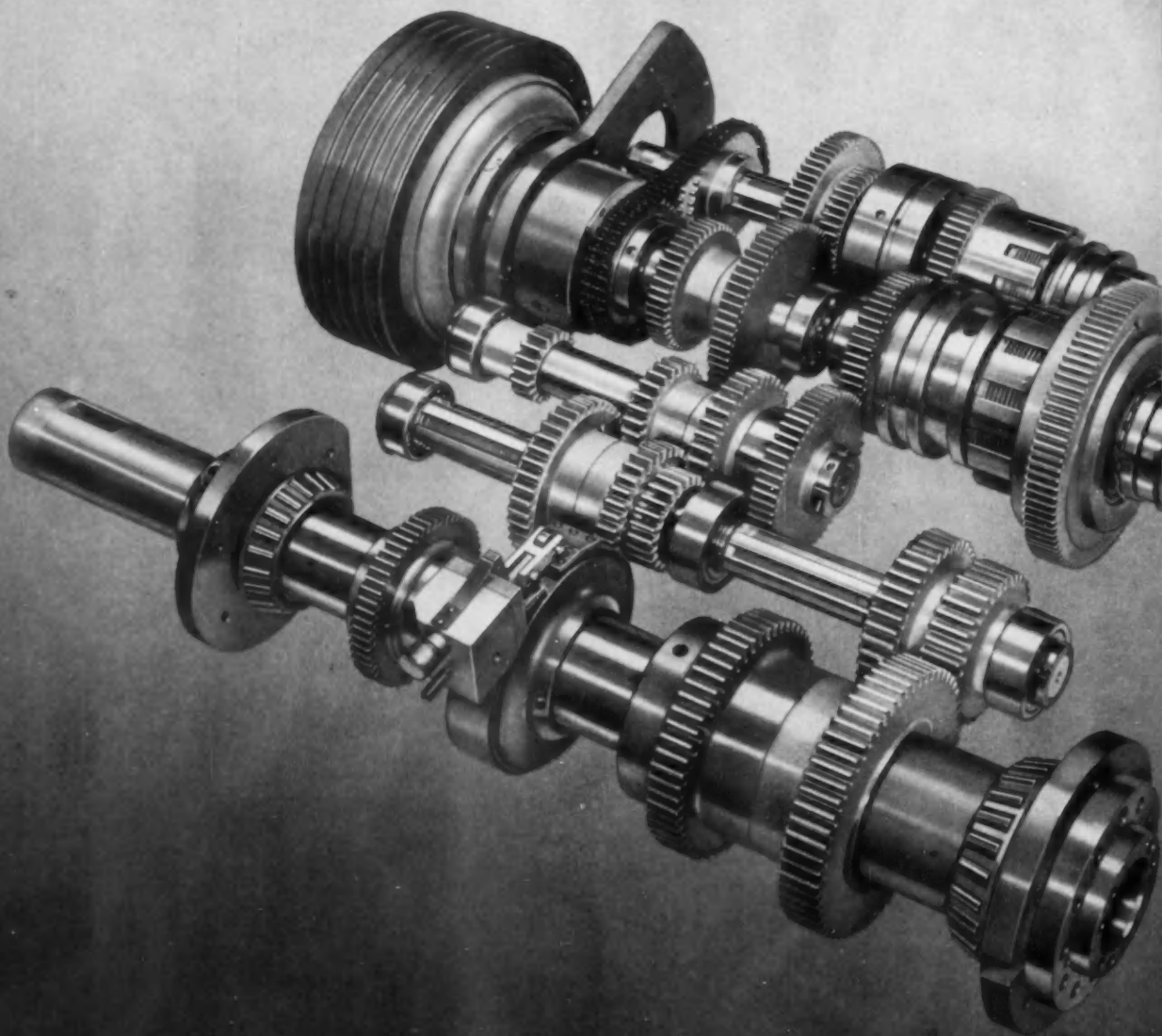
AIR CONTROL

**HANNIFIN**  
VALVES

Complete information on all Hannifin Air Control Valves is in this catalog. It belongs in your files. Write for your copy. Hannifin Corporation, 543 S. Wolf Road, Des Plaines, Illinois.



*The power reserve and range of speeds*  
**YOU'LL NEED FOR THE**



# TOOLS OF TOMORROW

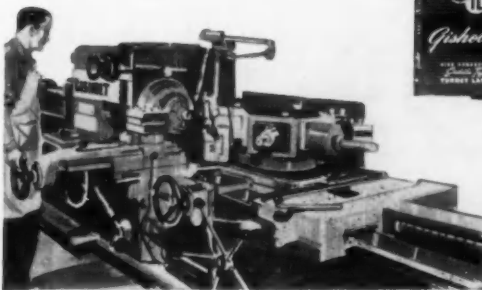
## New GISHOLT MASTERLINE SADDLE TYPE TURRET LATHE

**WANT MAXIMUM OUTPUT AND ACCURACY** from today's carbide tools—with an ample reserve of power and speeds to meet tomorrow's tooling requirements?

That's what you'll get—*now*—from this powerful, rugged Gisholt MASTERLINE Saddle Type Turret Lathe. Prime example of this machine's advanced features is the rugged Headstock Gear Train, shown at the left. Here, you can get 24 different forward speeds—all from a *single*-speed motor. This means you get *full* power *all* the time—a critically important feature for those heavy cuts at punishing feeds.

But that's not all. To give you maximum performance from this powerful gear train, Gisholt designers have backed it with faster speed changes through the Hydraulic Speed Selector (effortless speed shifts without waiting or computing); a hydraulically operated Hi-Lo speed change in a 6:1 ratio (without stopping the spindle or shifting gears); and a new Self-Adjusting Electric Clutch and Brake (smooth, fast starting and stopping, plus more accurate inching of the spindle).

Ask your Gisholt Representative to give you the complete facts. Why not call him today?



ASK FOR complete set of Gisholt MASTERLINE Saddle Type Turret Lathe Bulletins.

# GISHOLT

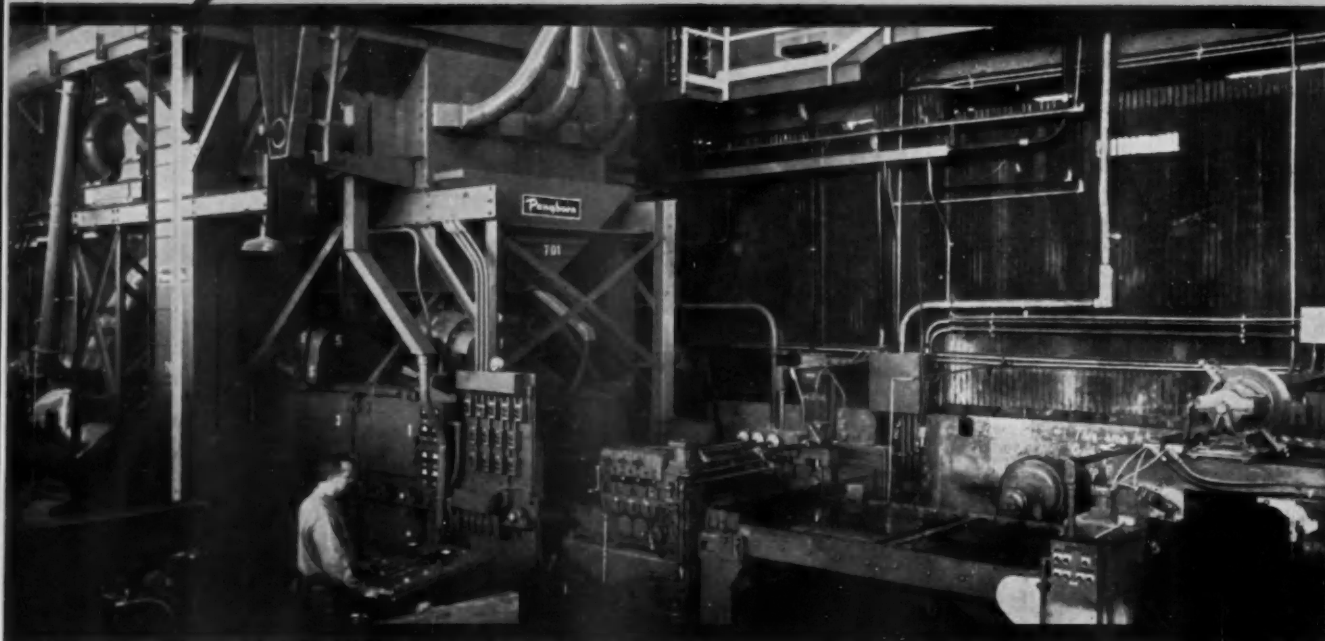
MACHINE COMPANY



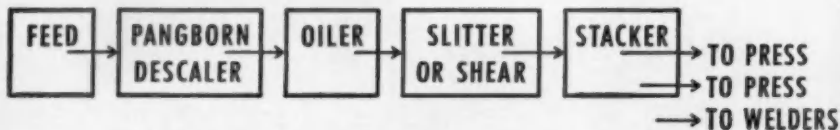
Madison 10, Wisconsin, U.S.A.

# STEEL FABRICATORS! NOW Pangborn offers you

# Automation!



For fabricators using flat steel, coils, cut lengths—Pangborn Rotoblast® Descaling Machines offer *straight line* operation. One feed through descaler, oiler, slit and stacker!



## Here's How You Benefit!

- You cut costs by using hot rolled unpickled steel.
- You speed production.
- You reduce labor costs.
- You eliminate problem of acid fumes and acid disposal.
- You use minimum floor space.

For full details on automation for fabricators, write for Bulletin Number 224 to Pangborn Corporation, 3900 Pangborn Blvd., Hagerstown, Maryland.

## Pangborn

### BLAST CLEANS CHEAPER



Rotoblast Blastmaster® & Continuous-Flo Barrel



Rotoblast Tables & Table-Rooms



Special Blast Rooms & Cabinets



Pangborn Dust Control Equipment

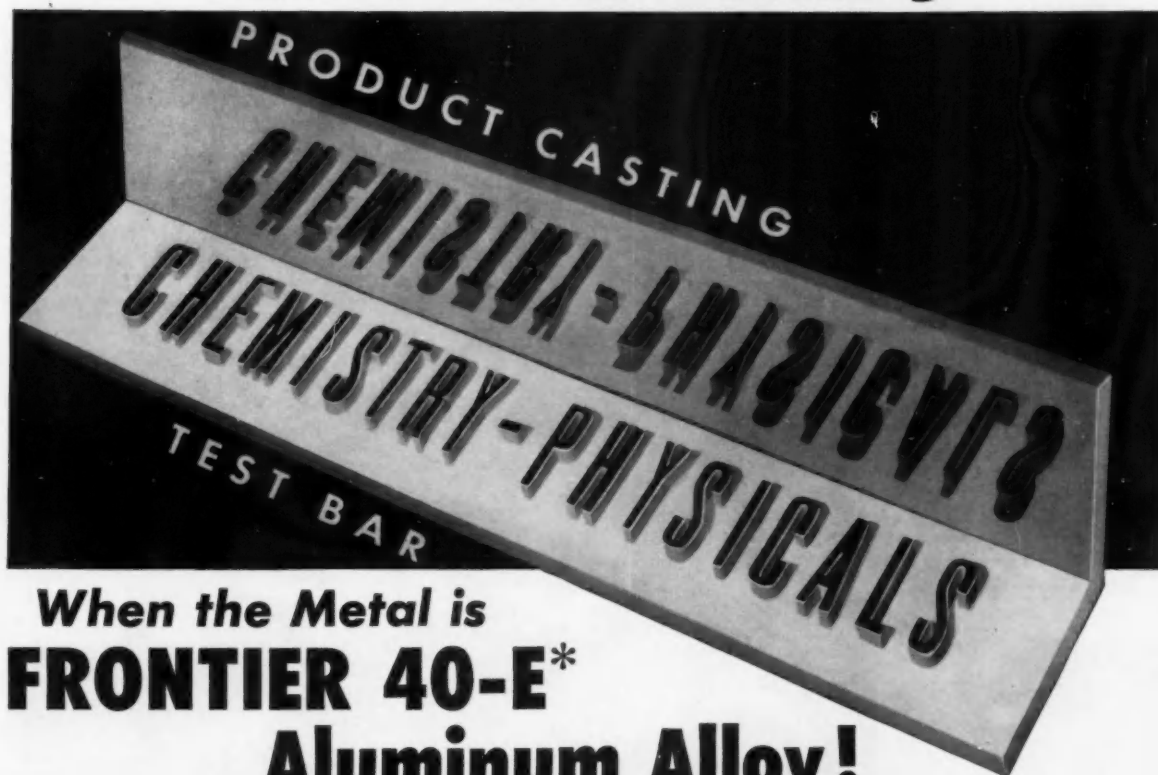


Molleabrade Shot & Grit

Manufacturers of Blast Cleaning and Dust Control Equipment.

4BS

# The Test Bar Mirrors the Quality of the Product Casting



## When the Metal is **FRONTIER 40-E\*** Aluminum Alloy!

Whether you purchase Frontier 40-E Aluminum Alloy castings direct or from a foundry licensed to produce this alloy, you can be sure that the high qualities that have made this alloy famous are being maintained. How is this controlled? Test bars are required from all licensees. These are sent to the technical research laboratory of the Frontier Bronze Corp. for complete analysis and physical testing.

One of the most unusual features of Frontier 40-E Aluminum Alloy is the fact that the physical properties

which spell high quality in the test bar appear uniformly throughout a large casting. And since Frontier 40-E is a non-heat-treated aluminum alloy the high strength physical properties are obtained by natural aging at room temperatures. The high yield strength of Frontier 40-E Aluminum Alloy is of special value in designing parts that must be light in weight and yet resist distortion or deformation.

Yes, the test bar mirrors the quality of the product casting . . . here's proof.

FRONTIER 40-E	TEST BAR	CASTING
Yield Strength	23,500	22,700
Tensile Strength	36,600	35,500
Elongation	7.5	7.5



\*REG. T. M.

Please send me a copy of the Alloy Data Book giving Engineering and Metallurgical Facts on the physical properties of Frontier "40-E".

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## FRONTIER BRONZE CORPORATION

4885 PACKARD ROAD, NIAGARA FALLS, NEW YORK

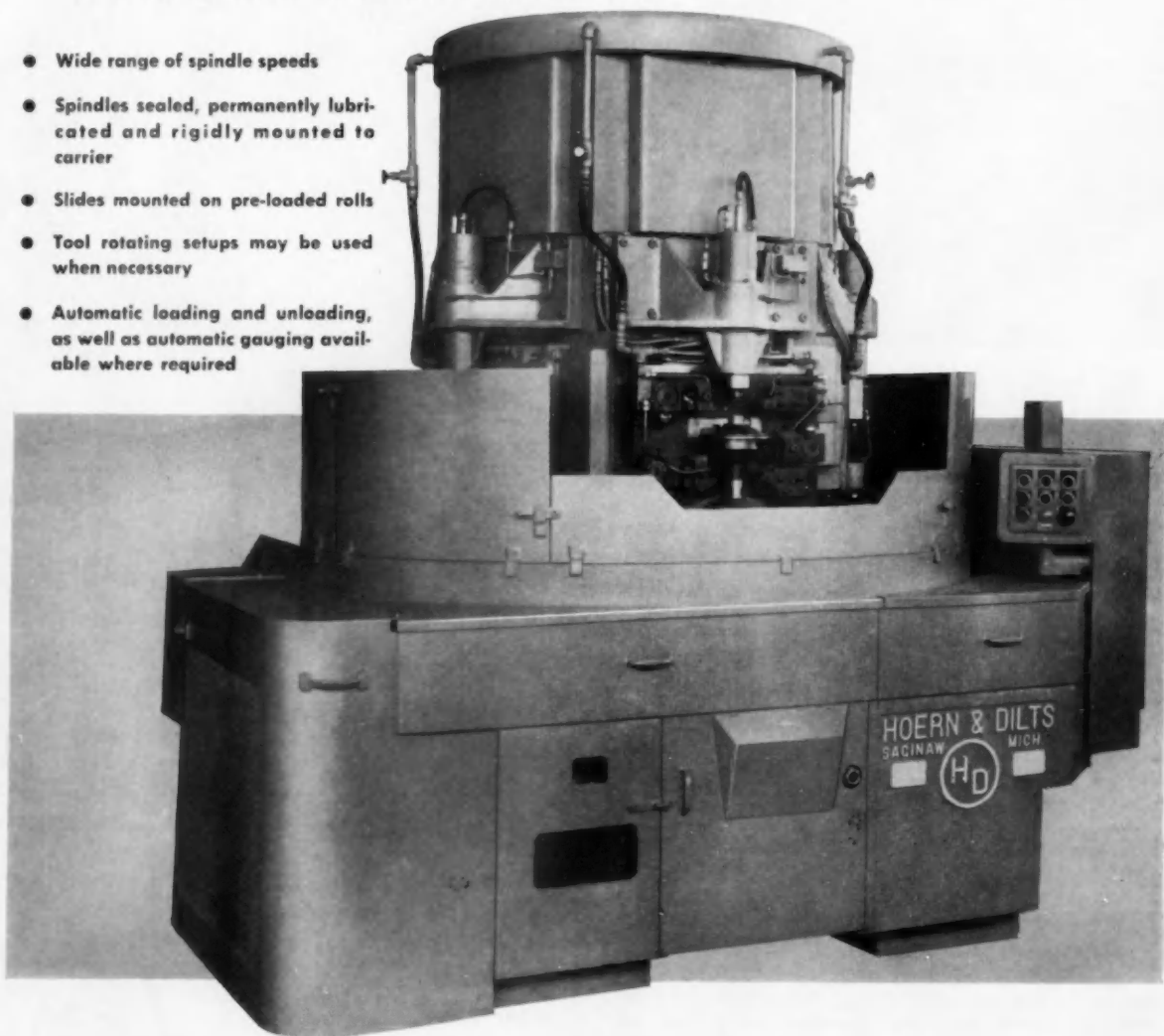
for your precision boring . . . .

## 5 times as many pieces every hour

Hoern & Dilts continuous boring machines have five sets of contour turning and boring slides, each serving one or two spindles and continuously moving around a central column. Slides and spindles travel together. Operator merely loads and unloads.

Pieces are completely turned, bored and faced in one circuit around the machine. One set of stationary cams actuating all slides provides absolute duplication of dimensions between stations.

- Wide range of spindle speeds
- Spindles sealed, permanently lubricated and rigidly mounted to carrier
- Slides mounted on pre-loaded rolls
- Tool rotating setups may be used when necessary
- Automatic loading and unloading, as well as automatic gauging available where required



Hoern & Dilts engineers will welcome the opportunity to co-operate with you on any high production finishing operation.

## HOERN & DILTS DIVISION

The New Britain Machine Company • Saginaw, Michigan

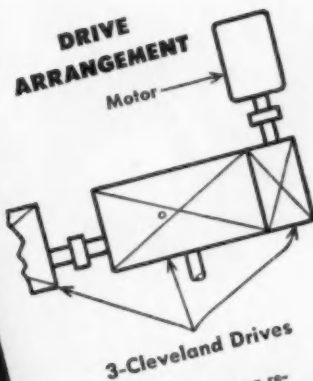
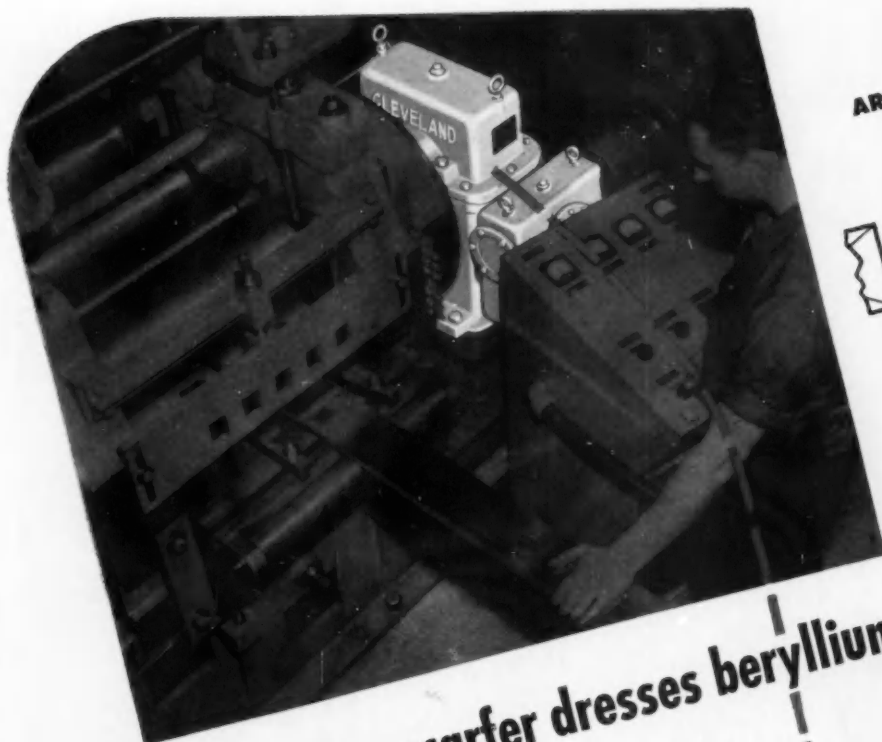
OTHER NEW BRITAIN MACHINE TOOL DIVISIONS

New Britain-Gridley Machine Division  
New Britain, Connecticut

Automatic Bar and Chucking Machines  
Precision Boring Machines and New Britain  $\pm .001$  Copy Turning Lathes

Lucas Machine Division  
Cleveland, Ohio

Precision Horizontal Boring,  
Drilling and Milling Machines



Note the small overhung reducer is transmitting power to both of the larger Clevelands—a compact but powerful drive arrangement.

## CLEVELAND-driven scarfer dresses beryllium-copper slabs

**S**pecially designed to handle beryllium-copper alloys, this automatic rotary scarfer puts smooth, clean surfaces on bar stock ranging from  $\frac{5}{16}$ " to  $1\frac{1}{8}$ " in thickness, up to 14" wide.

Drives are Cleveland Worm Gear Speed Reducers, actuating both the rotary tooth cutter and the bar-drawing mechanism. Power from the motor is transmitted at a uniform, predetermined rate, ensuring precision in production dimensions and economy of machine operation. Furthermore, the compactness of the right-angle Cleveland drive arrangement permits important space saving in the equipment installation.

Wherever you need to operate a machine efficiently, smoothly and economically, count on using a Cleveland. Let us send you Catalog 400 and the name of our nearest representative who is prepared to help you select Clevelands best fitted to solve your transmission needs. The Cleveland Worm & Gear Company, 3274 E. 80th St., Cleveland 4, O. Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

**CLEVELAND**  
Worm Gear  
*Speed Reducers*





# cooperative research

helps you solve  
sealing problems  
**BETTER,  
FASTER**

*These unequalled  
facilities are at  
your service*



## DESIGN

The most qualified team of design specialists are selected from C/R's engineering staff of more than a hundred, and assigned to work with you on your specific sealing problem.

## MATERIALS

C/R has a wide selection of sealing materials suitable for temperatures from  $-100^{\circ}$  to  $500^{\circ}$  F., pressures from 0 to 10,000 p.s.i., and shaft speeds up to 80,000 r.p.m.

## TESTING

Four complete C/R test laboratories are maintained solely to verify seal designs and materials with your specifications, with test runs in special C/R Machines and in customer units.

## PRODUCTION

Six C/R plants can produce your seal in any quantity . . . six, sixty or 600 thousand . . . with consistently uniform quality . . . and deliver on schedule.

## EXPERIENCE

Over 75 years of experience — broadest in the fluid sealing field. More automobiles, farm equipment and industrial machines rely on C/R Oil Seals than on any similar sealing device.

### CHICAGO RAWHIDE MANUFACTURING CO.

1203 Eason Avenue

Chicago 32, Illinois

*Offices in 55 principal cities. See your telephone book.*

In Canada: Chicago Rawhide Manufacturing Co., Ltd., Hamilton, Ontario

Export Sales: Geon International Corp., Great Neck, New York

C/R Products: C/R Shaft and End Face Seals • Sirvene (synthetic rubber) molded parts • Sirvis-Conpor mechanical leather cups, packings, boots • C/R Non-metallic Gears • C/R Rawhide and nylon hammers.



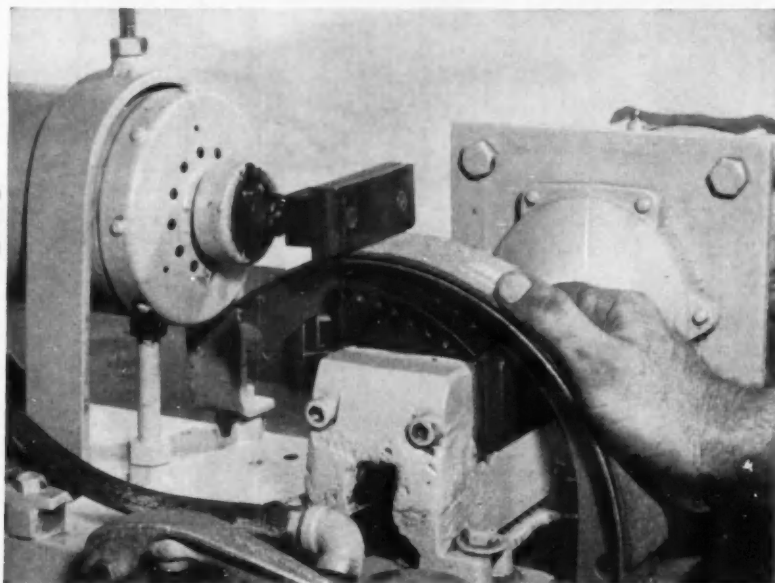
**CHICAGO  
RAWHIDE**

News about

# B.F. Goodrich Chemical raw materials

## Ray-BOND ADHESIVE MADE WITH HYCAR

**withstands  
2,000-pound  
shear test**



*A 2,000-pound shear test is given every Raybestos brake shoe assembly to prove sureness of the bond.*



*Raybestos lining segments are being pre-cemented with Ray-BOND adhesive prior to assembly on brake shoes.*

**QUALITY** unsurpassed by original equipment is guaranteed on Raybestos-Manhattan re-conditioned brake shoes. The lining on every shoe must resist this 2,000-pound pull that tries to separate it from the metal.

This superior bonding is provided by a cement modified with Hycar dry rubber . . . to provide a tough, continuous adhesive film which may be applied uniformly. In service, the adhesive has the strength and elasticity to withstand impact, and excellent heat resistance.

Where you want to improve materials, investigate Hycar. It offers superior oil, water and heat resistance, flexibility with strength, superior aging and abrasion properties. In dry form, compounded Hycar extrudes and molds easily. In latex form, it is an excellent pigment binder and impregnating material.

For complete information write Dept. EA-5, B. F. Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

**B.F. Goodrich Chemical Company**  
A Division of The B.F. Goodrich Company

# Hycar

Reg. U.S. Pat. Off.  
*American Rubber*



GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors

## LET'S TALK

## THE LATEST

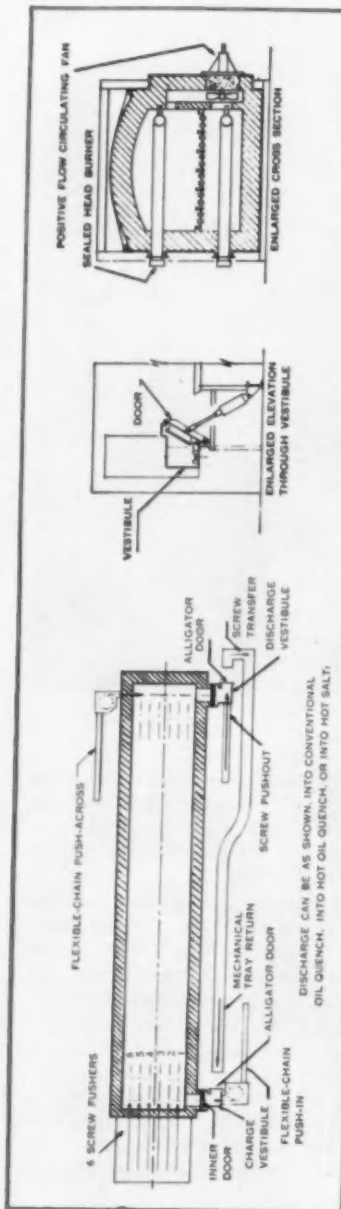
## IN

## FURNACE DESIGN

Visualize six rows of stock — each row may be of a different size and shaped part and may move at a different rate of speed through the furnace. That's real versatility!

This is the nutshell story of a new Holcroft design. Here are more facts:

**HEATING**—Sealed head radiant tube burners heat the installation. Air and fuel are metered and progressively mixed as they pass through the tubes providing maximum efficiency at all rates of heating. A positive flow circulating fan assures even distribution of heat and atmosphere around the work.



**MATERIAL MOVEMENT**—Work trays push each other over silicon carbide rails. Ball bearing type screw pushers are used. An unusual flexible chain push in and push across saves valuable space and permits the use of smaller doors (less heat loss, less purging gas).

**OTHER FEATURES**—A safety-designed alligator door is air tight when closed, opens upon gas or power failure.

Used with the Lo-Dew gas generator, a wide variety of processing (carbo nitriding, carburizing, clean hardening, carbon restoration, etc.) can be handled.

If you run a mixed production schedule or "all alike" parts—you'll do best to look carefully at what Holcroft can do for you. Better do it right now. Just write!

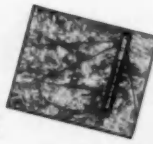
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6545 EPWORTH BOULEVARD • DETROIT 10, MICHIGAN  
PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE



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BLAZING THE  
HEAT TREAT  
TRAIL WITH  
HOLCROFT



## CALENDAR

OF COMING SHOWS AND MEETINGS

- American Society of Body Engineers, annual convention, Rackham Bldg., Detroit, Mich. . . . . Oct. 17-19
  - International Motor Show, Earls Court, London, England . . . . . Oct. 17-27
  - National Conference on Industrial Hydraulics, Sherman Hotel, Chicago, Ill. . . . . Oct. 18-19
  - SIPMHE Protective Packaging and Materials Handling Exposition, Kiel Auditorium, St. Louis, Mo. . . . . Oct. 21-24
  - Association of National Advertisers, annual meeting, Drake Hotel, Chicago, Ill. . . . . Oct. 22-24
  - National Safety Congress and Exposition, Chicago, Ill. . . . . Oct. 22-26
  - ASME-AIME Joint Fuels Conference, Sheraton-Park Hotel, Washington, D. C. . . . . Oct. 24-25
  - AMA Special Manufacturing Conference, Hotel Roosevelt, New York, N. Y. . . . . Oct. 24-26
  - Drop Forging Association, fall industry meeting, Biltmore Hotel, New York, N. Y. . . . . Oct. 25-26
  - Gray Iron Founders' Society, annual meeting, Homestead, Hot Springs, Va. . . . . Oct. 31-Nov. 2
  - AMA Special Conference on Mergers and Acquisitions, Hotel Roosevelt, New York, N. Y. . . . . Oct. 31-Nov. 2
  - SAE National Diesel Engine Meeting, Drake Hotel, Chicago, Ill. . . . . Nov. 1-2
  - National Tool & Die Manufacturers Association Convention, Statler Hotel, Hartford, Conn. . . . . Nov. 1-4
  - SAE National Fuels and Lubricants Meeting, Mayo Hotel, Tulsa, Okla. . . . . Nov. 8-9
  - Cycle and Motorcycle Show, London, England . . . . . Nov. 10-17
  - National Industrial Development Exposition, Coliseum, New York, N. Y. . . . . Nov. 12-16
  - International Autorama Exposition, Commercial Museum, Phila., Pa. . . . . Nov. 24-Dec. 1
  - ASME Annual Meeting, Hotel Statler, New York, N. Y. . . . . Nov. 25-30
  - Third International Automation Exposition, New York Trade Show Building, New York, N. Y. . . . . Nov. 26-30
  - ASME National Exposition of Power and Mechanical Engineering, Coliseum, New York, N. Y. . . . . Nov. 26-30
  - American Association of State Highway Officials, annual meeting, Atlantic City, N. J. . . . . Nov. 27-30
  - Society of the Plastics Industry, Film, Sheet, and Coated Fabrics Div. Conference, Commodore Hotel, New York, N. Y. . . . . Dec. 4-5
  - National Automobile Show, Coliseum, New York, N. Y. . . . . Dec. 8-16
  - Material Handling Institute, annual meeting, Biltmore Hotel, New York, N. Y. . . . . Dec. 10-11
- 1957
- Chicago Automobile Show, International Amphitheater, Chicago, Ill. . . . . Jan. 5-13
  - SAE Annual Meeting, Sheraton-Cadillac and Statler Hotels, Detroit, Mich. . . . . Jan. 14-18
  - American Roadbuilders Association, road show and convention, International Amphitheater, Chicago, Ill. . . . . Jan. 28-Feb. 2

★ Unique Tribute to ★  
Engineering and Performance




Sealed Power Piston Rings  
are approved for

NOT ½ NOT ¾ **NOT 99%**

★  
—but **ALL** car and truck  
engines and automatic  
transmissions made by  
**ALL** automobile  
manufacturers  
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*We just thought  
you'd like  
to know!*

**Sealed Power Piston Rings**



**SURE, POWER STEERING  
MAKES THE JOB EASIER.  
BUT IT'S THE ADDED SAFETY  
THAT COUNTS MOST.**

**OUR POWER-STEERED  
RIGS STAY ON SCHEDULE  
BETTER, TOO.**

**EITHER WAY,  
POWER STEERING MAKES  
GOOD BUSINESS SENSE.**

## THE CASE FOR POWER STEERING ON TRUCKS!

The trend to power steering on trucks is based on one very practical reason—operators of trucks equipped with power steering have invariably found that the added safety and greater operating efficiency of their vehicles have demonstrated that power steering is indeed a sound investment.

Truck drivers using power steering report less tension and fatigue in normal driving and appreciate the positive control that blocks road shock from chuck holes and prevents loss of control if the truck is forced out on a soft shoulder.

The dispatcher knows the importance of regularly maintained schedules. He is quite aware that with power steering drivers are more relaxed and are better drivers than tired drivers. Thus, power steering not only reduces the hazard of road accidents, but helps the driver to maintain established schedules through better vehicle control.

In short, power steering, by saving time and money, contributes materially to a more profitable operation.

Truck manufacturers are always eager to offer their customers features

that will make truck operation safer and more profitable and, at the same time, give their dealers every selling advantage.

That's why more and more truck manufacturers are offering performance-proven Bendix\* Power Steering as original factory equipment.

\* If you would like to know why power steering for trucks is perhaps even more logical than power steering for passenger cars, we have prepared an interesting folder on the subject.

Write for your copy today. We think you'll be convinced.

\*REG. U.S. PAT. OFF.

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## High Spots of This Issue

### ★ Chevrolet Offers Fuel Injection and New Transmission

Armed for the 1957 sales battle with a new fuel injection system that will be optional on the 283-hp Corvette engine, Chevrolet makes a strong bid for the car dollar. The latest models also have numerous other innovations. Page 48.

### ★ Rambler Offers 190-Hp, V-8 Engine

Coming into its own as a separate make of car, the 1957 Rambler now offers a V-8 engine as well as a six-cylinder power plant. The 13 models in the line are built on a 108-in. wheelbase and exhibit styling improvements. Page 54.

### ★ Latest Vehicles at Britain's Commercial Motor Show

Held late last month at Earls Court in London, the Commercial Motor Show included vehicles produced by 40 international makers. This on-the-spot report highlights outstanding features of the most notable exhibits. See Page 58.

### ★ Automatic Chevrolet Rear Wheel Bearing Production

Mechanization from the word "go" characterizes output of Chevrolet rear wheel bearings at the Sandusky, O., plant of New Departure Div. of General Motors Corp. The author takes us on a tour of the automated processes. Page 64.

### ★ Mechanized Stamping Line for Truck Cab Cowl Tops

Key to economical production by Budd Co. of cowl tops for Ford truck cabs is a flexible mechanized stamping line. Each individual operation along the line is carefully described and explained in this illustrated article. See Page 70.

### ★ 34 New Product Items And Other High Spots, Such As:

Aluminum automobile radiators; torque control tools; Lincoln line for 1957; plastic tooling; Hudson Hornet Series for 1957; coin dimpling die; Chevrolet truck line; fans and instrument panels; and Ford fuel system laboratory.

**Complete Table of Contents, Page 3**  
**Automotive and Aviation News, Page 33**

**AUTOMOTIVE INDUSTRIES COVERS**  
 PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES  
 • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY •  
 PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT  
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# News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 115, No. 8

October 15, 1956

## AC Spark Plug Div. Group Set To Develop Pneumatic Elements

Formation of an engineering group in AC Spark Plug Div. of General Motors to develop automotive pneumatic powered components supports reports of the corporation's plans for air suspension on its cars in 1958. The announcement says that developments in pneumatic components already achieved show promise of being ready for production in the near future, possibly late next year.

## S-P Shareholders To Vote Oct. 31 On C-W Proposals

Proxy statements mailed to Studebaker-Packard shareholders notifying them of a special meeting to be held Oct. 31 show that James J. Nance, former S-P president and general manager, will be paid \$286,000 for resigning his job. Under the settlement, Nance will continue to be paid his \$150,000-a-year salary until next Jan. 31, and acquire \$600,000 in insurance policies carried on his life.

Nance's resignation voids his options to buy stock in the company. Nance was serving under a 1952 contract under which his salary was to increase, starting in 1957, to reach \$200,000 a year by 1963. It also guaranteed him \$40,000 a year as a consultant for 15 years after his resignation. Nance said that he would forfeit his rights to the settlement if he should take "competitive employment," meaning employment with another automobile company.

At the Oct. 31 meeting, shareholders will vote on the management contract proposal with Curtiss-Wright Corp., which would give the latter company a big voice in Studebaker-Packard operations. In addition, shareholders will vote on a proposal which would give Curtiss-Wright option to buy up to five million common



Ford Thunderbird for 1957 in hardtop and soft top models.

shares of S-P stock at \$5 a share and on a proposal to change the par value of the stock to \$1 from \$10. They will also vote on several proposals made by a stockholder, Detroit attorney Sol A. Dann, one of which calls for dissolving the corporation.

## Lower Bodies, Four Engines Offered in '57 Thunderbird

Lower, longer, and more powerful, the 1957 Ford Thunderbird has a body (not including the bumpers) that is 5½ in. longer and about ½ in. lower than that of the 1956 model. Overall length, however, is reduced three in. by placing the spare tire in the trunk.

A special 270-hp V-8 engine is available as an optional power plant on 1957 Thunderbirds with standard, overdrive, or Fordomatic transmissions. Also available as optional equipment is a special 285-hp V-8 engine. Both of these 312 cu. in. engines are equipped with dual, four-barrel carburetors and have a 9.7 to 1 compression ratio.

The standard engine for overdrive or Fordomatic transmissions is a 245-hp, 312 cu in. V-8 with four-barrel carburetion. The standard one for

manual shift transmission is a 212-hp, 292 cu in. V-8 with a two-barrel carburetor.

Notable styling features on the 1957 Thunderbird are: new front and rear bumpers with integral parking lights in the front bumper and integral exhaust ports in the rear; a bigger grille; redesigned front fenders; body-fitting seats for driver and passenger; longer quarter panels incorporating canted fins; and a longer, restyled rear deck lid.

New engineering features include: larger brakes; redesigned rear axle incorporating a straddle-mounted pinion and offset drive shaft; 14-in. wheels; and engine modifications to provide increased compression, horsepower, and torque.

Optional equipment includes a transistorized radio which automatically adjusts its volume to the speed of the car, a Dial-O-Matic power seat which the driver can preset to the most comfortable position, and power brakes, steering and windows.

The new Thunderbird can be obtained in 10 solid exterior colors, 10 hardtop colors, and four soft-top colors. The hardtop with porthole is standard equipment, while the solid hard top is optional.

# News of the AUTOMOTIVE



## ITALIAN DIESEL BUS SEATS 46 PASSENGERS

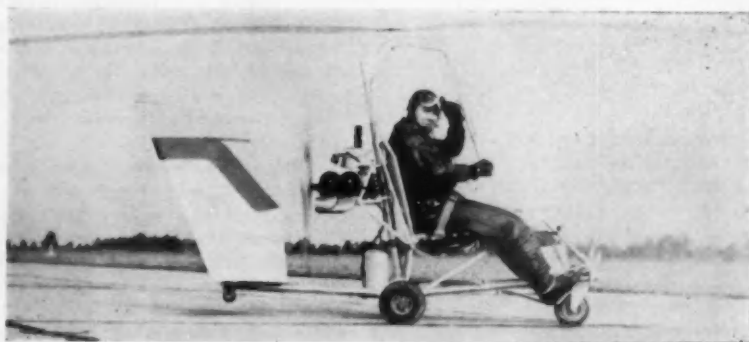
*The Italian Super Oriane intercity bus has a wheelbase of 18 ft. 10.2 in., and a normal seating capacity of 46 passengers. It is powered by a 175-hp, V-8 Diesel engine with direct injection. Gearbox has eight forward speeds and two reverse.*

## Broader Line of Cars Buys Chrysler 1957 Hopes

The announcement by Chrysler Corp. that it spent more than \$300 million to design, test, tool up, and prepare plants for 1957 production, plus a broadening of its automobile line, supports the corporation's optimism about automobile sales next year. At a national press preview of its 1957 line of cars at the corporation's proving grounds in Chelsea, Mich., Chrysler president, L. L. Colbert, expressed confidence that 1957 approaches the potential of 1955 as one of the biggest years for the automobile industry.

While Mr. Colbert did not comment on the number of cars the industry

might sell next year, he listed four basic reasons why he thought 1957 sales should approach the all-time peak achieved in 1955. They are (1) a continued prosperous economy, which has carried personal income, industrial output and capital investment to record levels, (2) a strong underlying demand for transportation, as evidenced by excellent used car sales in 1956, (3) a return to the new car market of a sizeable portion of the 18 million persons who bought new cars in the past three years, and (4) the fact that 1957 automobiles represent a general model change-over throughout the industry.



## LIGHTWEIGHT FLYING MACHINE TAKES TO AIR

*Recently demonstrated by Bensen Aircraft Corp. is this novel single-rotor aircraft known as the Gyro-Copter. It is powered by a Nelson H59 air-cooled, four-cylinder two-stroke engine that develops 40 bhp at 4000 rpm. Weighing only 185 lb empty, it reportedly can lift with ease a load of 250 lb and fly to a 300-ft altitude.*

Chrysler is confident that the huge investment made to bring out its 1957 models will pay off in sizeable penetrations in every price range of the automobile market. To fulfill this aim, Chrysler for 1957 has broadened its line-up of cars considerably.

The De Soto, Chrysler, and Imperial lines each will include three models in different price ranges, as compared with only two models offered by those divisions in 1956. Additions for 1957 include a shorter 122-in. wheelbase De Soto called the Firesweep; a middle-priced Chrysler, the Saratoga; and a higher-priced Imperial to top off that line, called the Imperial Le Baron. Also to be offered for the first time will be a convertible model in the Imperial line. In the past, Imperial built convertibles only to special order.

As indicated earlier, the corporation's "bread-and-butter" Plymouth car, will spearhead the entire 1957 sales campaign. The Plymouth advertising budget will be the largest of any of the Chrysler Corp. divisions.

Also new in the Chrysler line-up for 1957 are new Plymouth, De Soto, and Dodge station wagons which have rear-facing third seats. These can be folded flush with the floor when not in use.

Some mechanical and styling features of Chrysler Corp. 1957 cars were described briefly in the Oct. 1 issue of AUTOMOTIVE INDUSTRIES. More detailed discussions of individual makes will be published in issues coinciding as closely as possible with public announcement dates.

## 1957 Packard Expected To Be Ready For New York Car Show

Packard and Continental have relinquished their individual space reservations for the National Automobile Show in December, but both undoubtedly will be displayed. Continental will be shown along with Lincoln, since it now has been merged with Lincoln Div.

Packard is expected to be on display with its 1957 model in the Studebaker exhibit. While show rules normally require showing of cars that are in production, Packard probably will be near that point.

# AND AVIATION INDUSTRIES

## **Expansion of Axle Div. Underway at Eaton Mfg.**

Eaton Manufacturing Co. is continuing its ambitious expansion program. Latest project includes construction of a new building at its Axle Div. and expansion of several departments.

A total of \$3.5 million will be spent on the program; about \$2.5 million of that amount is earmarked for new production equipment and machinery. In addition to a 14 per cent increase in manufacturing area, the program will provide a substantial increase in service and storage space.

## **Fifteenth Yale & Towne Plant Will Be Erected in Arkansas**

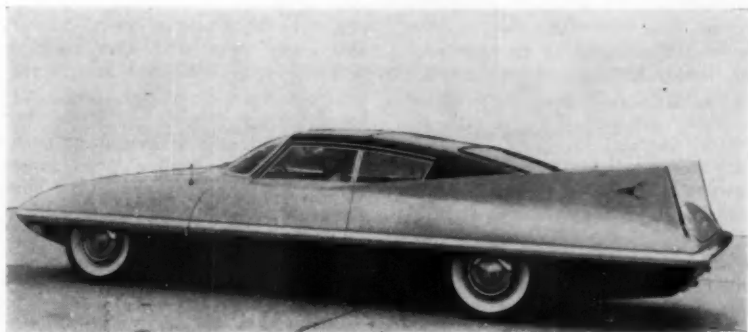
A new factory with more than 120,000 sq ft of floor space will be constructed by Yale & Towne Manufacturing Co. at Forrest City, Ark. The plant will be used for the manufacture of materials handling equipment and employ more than 400 persons. Yale & Towne will then have a total of 15 plants, including one now being built at San Leandro, Calif.

## **AMC Looks For Profit In '57; Sales Goal Is 150,000 Cars**

Shooting for an annual production rate of 150,000 cars (a volume which would place it in a profitable financial position), American Motors Corp. will continue to put strong emphasis on its "bread-and-butter" car—the Rambler—next year. While not discounting the importance of its larger models—the Nash Ambassador and the Hudson Hornet—AMC is placing its hopes on the sale of 100,000 Ramblers in 1957. This would be approximately 70 per cent of its anticipated output next year.

AMC fell short of the 150,000 mark for the 1956 model year by about 25,000 cars. With a new program planned for the Rambler, which includes marketing it as a separate make of car removed from the Hudson and Nash, AMC is highly confident it will reach its 1957 goal.

AMC also feels that the increased sizes of most competitive cars will be a definite stimulus for the com-



## **CHRYSLER IDEA CAR IS AERODYNAMICALLY STYLED**

*The new Chrysler Corp. Dart experimental car has streamlining akin to that of a high-speed hydroplane. The unique body design evolved from a series of wind tunnel tests to develop a shape with a minimum of wind resistance. Built on a 129-in. wheelbase, the car is powered by an advanced version of a Chrysler Fire-Power V-8 engine. Measuring 223 in. long, it stands 54 in. high and is 80 in. wide. A few of the engineering features released are: three-dimensional windshield; full-wrap, rubber-mounted bumpers; sliding roof panel; and induced brake cooling provided by forcing air through the finned wheel covers to the brakes at a rate of 8 cfm at 40 mph.*

pany's small car. It bases its belief on the premise that a new market is being developed for smaller cars. The fact that the 1957 Rambler will be on the market a full year, instead of three-quarters of a year for the 1956 model, also was cited as a favorable factor.

In addition to charting a new program for the Rambler, AMC also will place more emphasis on its other small car, the Metropolitan. The latter is now selling at the rate of 7000 units a year.

Evidence of the new stress to be placed on the Metropolitan is the recent appointment of a sales manager for this car alone. The increased sales emphasis on the Metropolitan is further reflected in AMC's plans to set up separate contract agreements with dealers for handling the small car.

It is also possible that some exclusive Metropolitan dealers who do not hold any AMC franchise at present may be appointed. These might include some dealers now marketing



## **MINIATURE PLASTIC SPORTS CAR IN PRODUCTION**

*The Berkeley sports car has a stressed-skin body and frame of reinforced plastic to keep the curb weight down to only 620 lb. Aluminum bulkheads and cross-members are molded into the body and platform sections. A two-cylinder, aircooled, 15-hp engine drives the front wheels, and independent suspension with swinging half axle is used all around. Berkeley Coachwork, Ltd., of England is now turning out 50 cars a week.*

# News of the AUTOMOTIVE

foreign cars, who might want to take on the Metropolitan as an additional line. Under AMC's current plans, the dealer organization will be expanded by about 500 outlets to a total of 3000 in the next six months.

If sales reach AMC's goal, the corporation should be in a much stronger financial position by the end of 1957. At a press preview of AMC's 1957 line of cars president George Romney said that operating costs have been reduced to a point where AMC is now

below the Big Three in assembly costs and many other production areas.

Much of the company's loss in the past year from carry-over factors has been largely eliminated. These included a \$5 million loss resulting from the necessity of buying V-8 engines from Studebaker-Packard; AMC now builds its own V-8 engines. Elimination of that expense, and others, has reduced operating budgets for 1957 by \$22 million on the basis of this year's volume.

## Ford Property In Dearborn To Be Held For Expansion

Ford Motor Co. does not now plan to sell any of the vacant property which it owns in Dearborn, Mich. Present plans are to retain all holdings for possible future expansion. The company owns approximately one-fourth of the city's 24 sq mile area, on which it pays about 60 per cent of Dearborn's total tax bill.

Only exception to the policy might be possible release of land for civic or educational uses. Since the properties were turned over to the Ford Motor Co. by the late Henry Ford, no large tract has been sold. The company has been constantly constructing new buildings in Dearborn.

## De Soto Drops Spare Tire From High-Priced 'Wagons'

De Soto is the first car company to eliminate the spare tire on certain models. The decision to drop the fifth tire was influenced by the recent development by Goodyear of a new dual chamber tire. The company says it will be able to carry a car safely as far as a full tank of gasoline will take it, after a puncture or other failure, thus eliminating the need for an extra tire.

The new tire will be included as standard equipment on all 1957 De Soto three-seat Explorer station wagons, the higher-priced station wagon line, but a spare will not be included. While other car companies also will offer the tire, it will be optional, at least from the outset.

## 'Portable' Air Conditioner To Be Offered By Chrysler

MoPar Parts Div. of Chrysler Corp. will offer a car air-conditioning unit as an accessory in the \$300 range soon. It is designed to fit 1957 and earlier Chrysler lines and to be transferable from one car to another when the owner sells his old vehicle.

Installation time is three to five hours. It has the same capacity as the factory-installed unit, but does not combine the heater, as does the 1957 Chrysler air-conditioning unit.

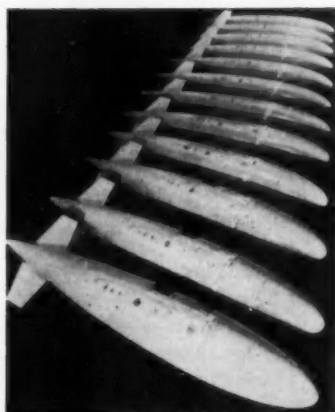
## 1956 WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

	For Weeks Ending				Total Jan. 1 to Oct. 6, 1956
	Oct. 6	Sept. 29	Sept. 22	Sept. 15	
<b>PASSENGER CAR PRODUCTION</b>					
Hudson.....	273	327	300	290	21,142
Nash.....	529	403	458	314	49,704
Rambler.....	1,765	1,570	1,645	1,234	7,772*
<b>Total—American Motors.....</b>	<b>2,567</b>	<b>2,300</b>	<b>2,603</b>	<b>1,838</b>	<b>78,698</b>
Chrysler and Imperial.....	348	72	0	0	79,656
De Soto.....	543	56	0	0	71,709
Dodge.....	2,540	2,626	0	0	141,621
Plymouth.....	3,703	1,864	0	0	316,975
<b>Total—Chrysler Corp.....</b>	<b>7,134</b>	<b>4,618</b>	<b>0</b>	<b>0</b>	<b>612,041</b>
Ford.....	28,034	23,282	12,099	4,925	952,414
Lincoln and Continental.....	914	1,187	861	542	37,620
Mercury.....	861	40	0	1,207	167,665
<b>Total—Ford Motor Company.....</b>	<b>29,609</b>	<b>24,469</b>	<b>12,960</b>	<b>6,674</b>	<b>1,177,699</b>
Buick.....	1,229	1,217	7,169	9,213	428,542
Cadillac.....	0	0	0	2,976	114,993
Chevrolet.....	13,960	0	10	30,960	1,206,889
Oldsmobile.....	1,137	5,736	7,150	7,008	345,183
Pontiac.....	2,380	4,444	5,769	5,156	280,752
<b>Total—General Motors Corp.....</b>	<b>18,706</b>	<b>11,397</b>	<b>20,079</b>	<b>55,363</b>	<b>2,356,359</b>
Packard.....	0	0	0	0	13,289
Studebaker.....	1,632	336	303	0	56,425
<b>Total—Studebaker-Packard Corp.....</b>	<b>1,632</b>	<b>336</b>	<b>303</b>	<b>0</b>	<b>69,714</b>
Checker Cab.....	94	96	116	96	2,831
<b>Total—Passenger Cars.....</b>	<b>59,742</b>	<b>43,206</b>	<b>36,141</b>	<b>63,974</b>	<b>4,297,442</b>
<b>TRUCK PRODUCTION</b>					
Available.....		11	7	6	294
Chevrolet.....	5,752	0	129	5,949	269,967
G. M. C.....	1,337	74	1,360	1,935	70,884
Diamond T.....	132	117	129	117	4,043
Divco.....	60	60	60	60	2,917
Dodge and Fargo.....	1,963	1,553	0	891	60,106
Ford.....	5,891	6,461	6,150	6,362	236,443
F. W. D.....	21	33	33	16	1,266
International.....	2,494	2,627	2,823	2,557	106,956
Mack.....	295	501	324	326	14,263
Marmen-Herrington.....	20	31	30	30	817
Rac.....	72	89	89	71	3,014
Studebaker.....	4	0	0	0	11,406
White.....	350	150	373	355	13,796
Willys.....	1,490	1,579	1,467	1,377	46,962
Other Trucks.....	69	103	103	78	4,331
<b>Total—Trucks.....</b>	<b>19,880</b>	<b>13,386</b>	<b>12,896</b>	<b>20,070</b>	<b>864,237</b>
Buses.....	71	52	60	64	3,290
<b>Total—Motor Vehicles.....</b>	<b>79,702</b>	<b>56,631</b>	<b>49,117</b>	<b>84,108</b>	<b>5,154,969</b>

\*—Prior to week ending September 1, 1956, Rambler production was included with Nash and Hudson.

# AND AVIATION INDUSTRIES



## PLASTIC FOR FUEL TANKS

Plastic is to replace metal in fuel drop tanks for a number of British military aircraft. Developed by Bristol Aircraft, Ltd., the tanks range in capacity from 50 to 500 gallons, it is stated.

## AMC Reported Slashing Prices On Hornet & Ambassador Cars

American Motors Corp. is said to be reversing the industry upward price trend on its Hornet and Ambassador lines for 1957. Obviously, one reason for the reduction is the use of AMC's own V-8 engine and the Hydra-Matic transmission in place of the Packard V-8 and Ultra-matic transmission, which imposed a heavy price penalty.

It may be that AMC has also written off the die costs for these cars on previous model runs to effect still further cost reductions. It will be interesting to see how AMC now fares with these lines in view of the lower prices.

## New 'Career Program' Kit Offered By General Motors

An up-to-date version of General Motors' "Career Program" kit, designed to attract students into jobs with GM dealerships, is now available to school counselors and dealers. The kit, which contains necessary material for presentation of job opportunities during high school "Career Days" each year, is the sixth to be put out by GM since 1954.

# AI TABLOID

Chrysler Corp. expects to begin partial production in February at its \$85 million stamping plant at Twinsburg, O.

\* \* \*

Kingham Trailer Co. has been purchased by Hercules Galion Products, Inc. . . . Ferro Corp. has acquired Patterson Foundry & Machine Co.

\* \* \*

Sharon Steel Corp. has changed the name of its Detroit Tube and Steel Div. at Dearborn, Mich., to Sharon Steel Corp., Dearborn Div.

\* \* \*

Norton Co. has started construction of a new \$2 million Central Service building at its Worcester Mass., plant. . . . Calumet Div. of Borg-Warner Corp. has started construction of a new office building.

\* \* \*

Niagara Machine & Tool Works has established a new district office in Indianapolis, Ind.

\* \* \*

AC Spark Plug Div. of General Motors Corp. has selected the name "Achiever" for its missile guidance systems.

\* \* \*

General Tire & Rubber Co. is expanding its plastics business with the acquisition of Lawrence Process Co., Inc., of North Andover, Mass.

\* \* \*

International Nickel Co., Inc., has made educational grants totaling \$1 million.

\* \* \*

Goodyear Tire & Rubber Co. will build a \$1 million plant devoted to the production of tread rubber at Chehalis, Wash.

\* \* \*

American Chemical Paint Co. has acquired all outstanding capital stock of Benjamin Foster Co.

Towmotor Corp. has completed acquisition of Gerlinger Carrier Corp. The latter will be operated as a wholly owned subsidiary of Towmotor.

\* \* \*

Budd Co. has announced a \$1.75 million expansion program for the Bridgeport, Pa., plant of its Continental-Diamond Fibre Div.

\* \* \*

Hamilton Standard Div. of United Aircraft Corp. has purchased a permanent site for its Florida engineering operations near St. Petersburg, Fla.

\* \* \*

Aluminum Co. of America has developed a new metal finishing procedure for aluminum sheet and extruded shapes.

\* \* \*

American Machine & Foundry Co. plans to consolidate its research and development activities at a \$4 million center at Stamford, Conn.

\* \* \*

Wall Colmonoy Corp. has formed the Walco Manufacturing Div. to produce heat-treated, brazed assemblies using tubular, stamped, and machined components. . . . Harvey Machine Co., Inc., has formed an Aluminum Structural Div.

\* \* \*

Verson Allsteel Press Co. has opened new offices at its 93rd St. and Kenwood location in Chicago, Ill.

\* \* \*

Bendix-Westinghouse Automotive Air Brake Co. has arranged to purchase Servel, Inc.'s assets and facilities for the manufacture of refrigeration compressors.

\* \* \*

Northrop Aircraft, Inc., has proposed a merger with Vertol Aircraft Corp.

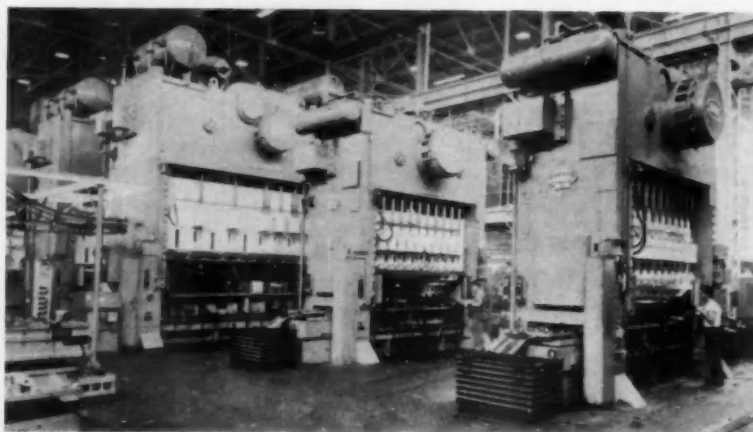
(Turn to page 166, please)

# News of the AUTOMOTIVE



## GMC RESCUE TRUCK DEVELOPED FOR DISASTER WORK

Rescue truck designed for rushing a life-saving team to any disaster area has been developed by GMC Truck & Coach Div. of General Motors Corp. The new panel-type vehicle provides room for eight rescue workers and some 150 pieces of emergency equipment. It is powered by a 270 cu in., six-cylinder engine developing 130 hp, and has a simplified gear shifting arrangement that changes it from two to four-wheel drive quickly. It is available with either Synchronesh or Hydra-Matic transmission.



## DAILY PRESSES NOW IN OPERATION AT FORD PLANT

These transfer feed presses were recently delivered to the new Sterling Plant of the Ford Motor Co. at Warren, Mich. Danly Machine Specialties, Inc., built six such transfer presses for Ford—two 600-ton capacity, two 1000-ton, and two 2000-ton. The 600-ton presses are producing approximately 5000 finished parts per eight-hour shift. The 1000-ton presses are producing approximately 2000 parts per eight hours. The presses will perform drawing and piercing operations on parts used in ball-joint suspension units of Ford and Mercury automobiles. They are built to accommodate up to 10 dies, and each die performs a separate operation. The entire press line will eventually be equipped with automatic handling devices to step up production.

## Oldsmobile Seeks to Enlarge Its Share of Market in 1957

Like many other car companies, Oldsmobile is hoping to capture a larger share of the car market in 1957. The company bases much of its optimism on the premise that the public next year will spend more than \$17 billion on new cars.

## Du Pont Selects Richmond, Va. For Site of New Nylon Plant

A new nylon plant, designed to produce 40 million lb of fiber annually to meet the growing demand for its use in tire cord and other industrial products will be built by the Du Pont Co. in Richmond, Va.

The multi-million dollar project will be erected on the site with the company's rayon plant and will be in addition to the large existing plant for production of rayon yarns there. Du Pont also manufactures cellophane at Richmond, but this will mark the first time that two different textile fibers have been made at the same location.

Work is expected to begin sometime late this year, and plant start-up is planned for the latter part of 1957. Heavy denier, high-tenacity nylon yarn, the type to be manufactured in Richmond, is also made by Du Pont at its Seaford, Del., and Chattanooga, Tenn., plants.

## Kaiser Buys and Will Expand Erie, Pa., Forging Facility

Kaiser Aluminum & Chemical Corp. has purchased the Erie, Pa., forging plant, which it has been operating under lease since 1954 from the Government. A \$5 million expansion program to increase annual capacity by more than six million lb and to broaden the range of forgings is planned.

Five new presses, a new building, and supporting equipment are included in the program. Two of the new presses—one of 1500 tons capacity and the other 750 tons—have been installed. Three larger ones with capacities of 3000, 5000, and 8000 tons are expected to be in operation by April, 1957.

# AND AVIATION INDUSTRIES

## Twin Coach Acquires Two Boating Equipment Firms

Twin Coach Co. recently took another step forward in its diversification program with the acquisition of two companies—the Luther Corp. and United States Outboard, Inc., both located in Warsaw, Ind. The two firms make small boat trailers, boats and related equipment. Last year the two companies had combined sales totaling \$1.5 million.

Twin Coach will merge the two companies into a new concern to be known as North American Marine, Inc. The new company will be headquartered in a 100,000 sq ft plant leased by Twin Coach in Warsaw.

## Pontiac To Offer Lucite Paint As Standard On Custom Models

Now that production of the new Lucite acrylic lacquer has been stepped up, the finish will become more readily available on certain automobiles. Pontiac Div. will offer the new finish as standard on all 1957 custom models. It will be available in seven colors.

## Ford Posts Price Increases Ranging To 6% On 1957 Cars

While the "average" increase on Ford's 1957 line of cars amounts to 2.9 per cent, only two of the company's models have been boosted less than that amount. All others have been hiked between 3.3 per cent and

## FORD PRICES\*

Fairlane Series	1956	1957
Tudor Victoria	\$2,010	\$2,011
Fordor Victoria	2,061	2,072
Tudor	1,873	1,957
Fordor	1,916	2,006
Fairlane 500 Series		
Tudor		2,011
Fordor		2,059
Tudor Victoria		2,064
Fordor Victoria		2,125
Sunliner	2,163	2,261
Station Wagon Series		
Ranch Wagon	2,001	2,077
Del Rio Ranch Wagon	2,061	2,137
Country Sedan (six pass.)	2,105	2,181
Country Sed. (nine pass.)	2,227	2,280
Country Squire	2,325	2,402
Custom 300 Series		
Tudor	1,773	1,861
Fordor	1,816	1,909
Custom Series		
Business Tudor	1,595	1,635
Tudor	1,690	1,738
Fordor	1,732	1,836

\* Suggested list charges at Dearborn, Mich., on six-cylinder Fords for 1957, compared with 1956 models; add \$93 for V-8 models. Prices do not include dealer charges, Federal excise, state, and local taxes, license fees, or optional equipment and accessories.

6 per cent, an analysis of the company's price list shows. The increases in the "suggested list" prices range from \$1 on the high-priced Fairlane Tudor Victoria to \$104 on the Custom Fordor.

Some small price adjustments have been made in the charges for accessories. While radios and conventional two-tone paint have been decreased slightly, prices of automatic transmissions, tinted glass, and the 312 cu in. engine on certain models have been increased.

## GM Euclid Div. to Put Up New Tractor Plant in Ohio

Since a high level of production is expected during the coming years in roadbuilding equipment, many concerns are expanding and modernizing their facilities to be in the position to produce at a higher capacity once the new highway program is in full swing. Euclid Div. of General Motors Corp. will construct a new 582,500 sq ft plant in Hudson, O., 35 miles southeast of Cleveland, where its present headquarters and manufacturing plant is located.

The Hudson plant will be used for the manufacture of crawler tractors. Production of tractors now is centralized in Euclid's Clinton Road plant in Cleveland. The Cleveland plant will be used for expanded production of scrapers.

Ground for the new facility in Hudson will be broken early next year.

## Radioisotope Source Facility Is Opened in Phila. by Budd

A facility to fabricate extremely strong radioisotope sources under license by the Atomic Energy Commission was unveiled early this month by The Budd Co. It is located in a sturdy concrete structure adjacent to Budd's Hunting Park Ave. plant in Philadelphia, Pa.

Said to be the first commercial one

(Turn to page 94, please)

## SOUTH ATLANTIC AREA SHOWS GAIN OF OVER A THIRD IN JULY AGAINST JUNE

### Regional Sales of New Passenger Cars

Zone	Region	July 1956	June 1956	July 1955	Seven Months		Per Cent Change		
					1956	1955	July over June	July over July 1955	Seven Months 1956 over 1955
1	New England	31,554	33,828	35,671	210,173	237,683	- 8.63	-11.85	-11.57
2	Middle Atlantic	101,461	112,583	127,532	693,910	799,320	- 9.58	-20.63	-13.19
3	South Atlantic	87,200	64,785	75,920	473,643	513,559	+34.60	+14.86	+ 7.79
4	East North Central	123,628	128,889	163,409	895,272	1,061,599	- 4.08	-24.34	-15.57
5	East South Central	23,732	24,290	34,727	179,719	206,070	- 2.33	-31.66	-12.79
6	West North Central	43,863	45,112	84,228	309,961	362,990	- 2.77	-19.11	-14.59
7	West South Central	46,775	46,017	62,002	325,750	373,242	+ 1.65	-24.56	-12.72
8	Mountain	17,392	19,891	20,701	119,268	130,769	-11.65	-15.98	- 8.79
9	Pacific	98,362	84,674	72,586	419,788	479,618	- 8.07	-18.18	-13.34
Total—United States		534,997	539,777	647,245	3,623,484	4,165,020	- 8.89	-17.34	-13.00

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt. Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va. Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn.

Zone 6—Iowa, Kan., Minn., Mo., Neb., N. D., S. D. Zone 7—Ark., La., Okla., Tex. Zone 8—Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo. Zone 9—Cal., Ore., Wash.

*Meeting the big change in cars with the big change in bearings:*

## **TIMKEN<sup>®</sup> and The Moto-Mated Way**



### **Revolutionary new mass production methods roll out millions of bearings... at lower cost**

**T**HE big change in today's cars places new demands on component parts. To meet the big change, the Timken Company introduces a whole new concept in bearing design, manufacture and supply. A concept mated to the changing needs of the automotive industry. It's the Moto-Mated Way.

Started in a uniquely modern mass production factory in Bucyrus, Ohio, the Moto-Mated Way recements our forward-looking partnership with your industry by: 1) Anticipating your changing needs, 2) Putting advanced machines to work for you, 3) Bringing you a better, more uniformly precise product at lower cost, and 4) Assuring you a virtually unlimited supply of bearings when you want them. (That's why we've just built the \$2 1/2 million Shipping Center, pictured above, at Bucyrus.)

Out of the Moto-Mated Way comes a

new breed of Timken<sup>®</sup> tapered roller bearings in 13 standardized sizes, mass-produced by the millions. New, lighter bearings to reduce unsprung weight, improve ride; smaller bearings to save space—permit more compact designs; capacity-packed bearings to take the loads of today's cars. And bearings, lower-priced than previous designs.

Already, automakers are saving 14.6% on millions of Moto-Mated bearings in front wheels of 1956 cars. And even greater economies will be possible when you find new uses for these new Timken bearings in rear wheels, pinion and differential.

Why substitute, when you can get the very best at low cost? Now, more than ever, Timken bearings are your No. 1 value. The Timken Roller Bearing Co., Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable: "TIMROSCO".

A black and white photograph of two men in suits. One man is holding a small Timken bearing and showing it to the other man. They appear to be in a professional setting, possibly a factory or office.

QUALITY, SERVICE, PUBLIC ACCEPTANCE MAKE  
**TIMKEN**  
TAPERED ROLLER BEARINGS  
YOUR NO. 1 BEARING VALUE

# Men in the News



Vickers, Inc., Automotive Div.—John H. Baer has been made sales and service manager, and Ray C. Conner has been named general manager.



Pratt & Whitney Co., Inc.—Alexander H. d'Arcambal will retire as president and general manager on Nov. 1, but will remain as a consultant and honorary chairman of the board. Edward P. Gillane will succeed him as president.



Michigan Tool Co.—Richard S. Hildreth and Harold S. Atherton have been appointed assistant chief engineer and advertising manager, respectively.

Bell Aircraft Corp.—Lawrence D. Bell has resigned as president and has been elected board chairman. Succeeding him in the presidency is Les-ton P. Faneuf.

Republic Gear Co.—William J. Taylor has been named vice-president and general manager.

Detroit Bevel Gear Co.—Fred F. Miller has been appointed vice-president.

Purolator Products, Inc.—Frederick C. Grunner has been appointed chief engineer, and Herbert R. Otto, Jr., has been named head of the new Technical Service Dept.

Dodge Div., Chrysler Corp.—Lewis J. Purdy has retired as vice-president.

General Motors Corp.—Howard E. Crawford has been named director of the Sales Section of the Distribution Staff.

Ford Motor Co.—Harold Boeschenstein was elected to the board of directors.

Pontiac Motor Div., General Motors Corp.—Russell L. Norris has become divisional comptroller.

Norton Co.—John Jeppson has been named general manager of the Abrasive Div. and director of manufacturing; Duane E. Webster, assistant to the director of manufacturing; Frank G. Gifford, works manager of the Abrasive Div.; David Reid, Jr., factory manager; and Harold E. White, assistant manager of crushing plants.

Mercury Div., Ford Motor Co.—Chester E. Bowie has been named sales manager.

Perfect Circle Corp.—George Frandsen is now sales engineer.

Firestone Industrial Products Co.—Randall D. Smith has been appointed vice-president in charge of manufacturing and development engineering.

Pastushin Aviation Corp.—Bruce H. Atwater has been appointed sales manager.

Leece-Neville Co.—Edward J. Sie-garth has been promoted to factory manager of all plant operations, and Homer C. Hueffed was made manager of the Industrial Engineering Dept.

Du Pont Co.—John F. Daley has been promoted to vice-president, director, and member of the executive committee.



Chrysler Corp.—Robert P. Laughna was appointed director of planning and material control for the Auto-motive Group.

Redmond Co., Inc.—Michael J. Koenig has been promoted to general sales manager.

General Motors Corp.—George V. Kieffer was appointed director of the Fleet Section.

Baker-Raulang Co.—Robert J. Laws has been named assistant chief engineer.

General Electric Co.—George M. Hartley has been appointed manager of marketing for the Metallurgical Products Dept.

(Turn to page 158, please)

## Necrology

William E. Boeing, Sr., 74, founder of Boeing Airplane Co., died Sept. 28, at Seattle, Wash.

Laurence R. McWeeney, 70, former vice-president of Russell, Burdsall & Ward Bolt & Nut Co., died Sept. 27, at Rye, N. Y.

Camille E. Dreyfus, 77, chairman of the board of Celanese Corp. of America, died Sept. 27, at New York, N. Y.

Charles A. Tilt, 79, founder and chairman of the board of Diamond T Motor Car Co., died Sept. 19, at Trout Lake, Wis.

Richard Fairey, 69, chairman of the board and managing director of Fairey Aviation Co., Ltd., died Sept. 30, at London, England.

Spencer H. Logan, 59, former chairman of the board of Sterling Engine Co., died Sept. 13, at New York, N. Y.

Robert J. Kelleher, 65, builder and organizer of the Paris plant of General Motors Corp., died Sept. 30, at Rochester, N. Y.

James E. Bigwood, 64, treasurer and vice-president in charge of finance for Fram Corp., died Sept. 22, at Keene, N. H.

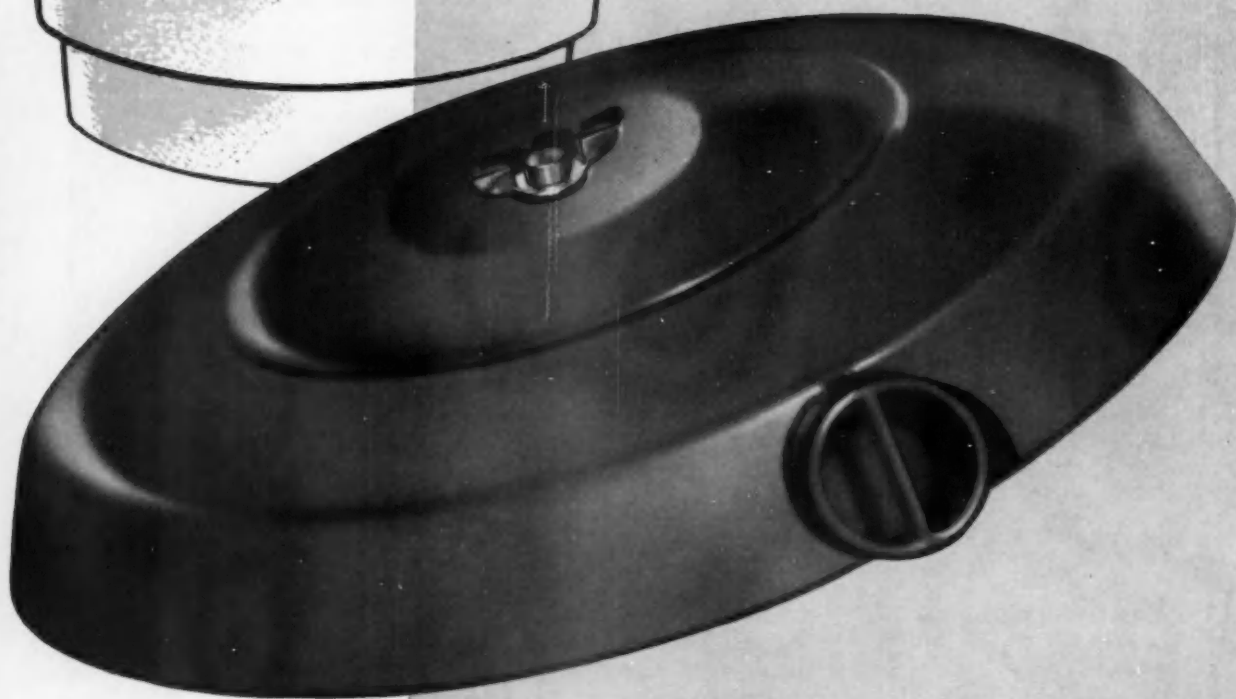
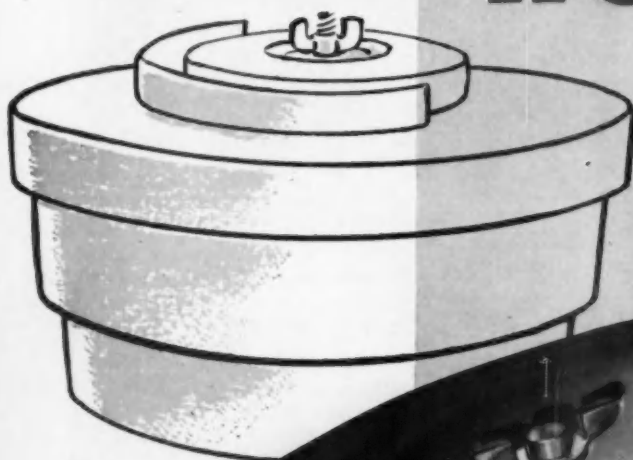
Leon L. Klaus, 51, manager of public information in the Public Relations Dept. of Armstrong Cork Co., died Sept. 23, at Lancaster, Pa.

# Air Cleaner-Silencers...

## Lower, Yes and Simpler, too,

### Thanks to

# HOUDAILLE CONDUIT TUNING\*



*\*Patents Pending*

Conduit Tuning for air cleaner-silencers...an exclusive Houdaille development...makes possible units of lower height to fit under modern low hoods. It's a simplified tuning system that helps reduce costs, too. What's more, it eliminates noises over a wider range of frequencies than resonator-type silencers...does not require the same critical tuning to specific frequencies.

Houdaille's complete and modern engineering and research facilities for designing and testing air cleaners and silencers are at your service in producing units of any type for your specific requirements.

## HOUDAILLE INDUSTRIES, INC.

### NORTH CHICAGO DIVISION

1900 FOSS PARK AVE., NORTH CHICAGO, ILL.

**OTHER HOUDAILLE PRODUCTS**  
SHOCK ABSORBERS • BUMPERS • FENDER PANELS • BRAKE LEVERS • DOOR LOCKS • SEAT ACTUATORS • SPECIAL AUTOMOTIVE TOOLS • HYDRAULIC AVIATION EQUIPMENT, AND DROP FORGED CARBON AND ALLOY STEEL HAND TOOLS.



*On Link-Belt's new one yard shovel...*

## ELASTIC STOP® nuts remain tight under terrific shock loads



Elastic Stop nuts secure clutch drums to gears.



### ELASTIC STOP NUT CORPORATION OF AMERICA

2330 Vauxhall Road, Union, N. J.

The engineering concept behind Link-Belt's new LS-98 Shovel-Crane provides a highly portable machine with big shovel characteristics plus stepped-up work cycles that produce substantial increases in capacity. To do this, the shovel-crane had to be built to stand up under heavy vibration and extreme shock loads. That's why Elastic Stop nuts were chosen for the critical fastening jobs throughout (i.e., hook rollers to brackets, clutch drums to gears, counterweight to upper frame, drum laggings to brake drums, engine mountings, side housing to revolving frame, etc.).

The locking principle of Elastic Stop nuts has been tested and proved by over 25 years of actual field service on equipment like this in every conceivable product of industry from locomotives to roller skates. What's special about this nut? For one thing, you can "stop" it at any position on the threaded length of the bolt . . . or wrench it tight against the work. No matter where you leave it on the bolt, it will remain tight in that exact position, even though you subject it to heavy vibration and shock loads. Reusable many times.

Elastic Stop nuts are available from a watchmaker's 0-80 all the way to 4"—in stainless steel, brass, aluminum and other alloys. Protect *your* product with "fastener insurance." We'll supply free test samples.

Elastic Stop Nut Corporation of America  
Dept. N7-105, 2330 Vauxhall Road, Union, N. J.

Please send me the following free fastener information:

☐ ELASTIC STOP  
nut bulletin

☐ Here is a drawing of our product.  
What self-locking fastener would  
you suggest?

Name \_\_\_\_\_ Title \_\_\_\_\_

Firm \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

The **No. 1 ROUTE**  
 ...To Spring Satisfaction  
 passes near you...



A unique springmaking service . . .

making available to bustling industrial areas a vast pool of integrated skill and research—through separate, complete operating Divisions.

Factory-trained sales and engineering field men.

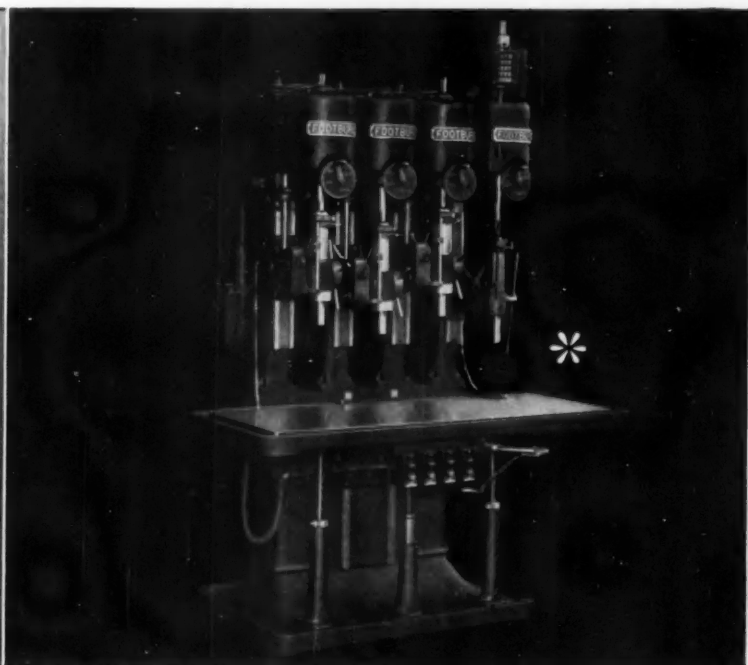
Design literature available on all types of springs.

*Divisions of*



**ASSOCIATED SPRING CORPORATION**

FOOTBURT  
FOOTBURT  
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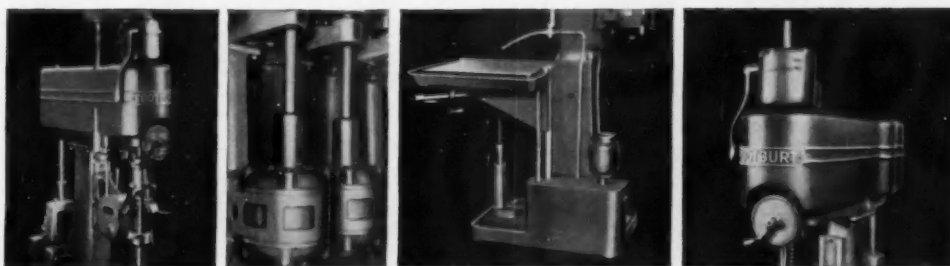
# *Sensitive* **drilling machines**

A FULL RANGE DRILLING MACHINE ENGINEERED FOR PRODUCTION

■ Built carefully to provide the required accuracy for fine tool room work, Footburt Sensitive are designed with the weight and stability to maintain close tolerances on day after day production work. The correct speed for a wide range of drilling, reaming, and counter-boring operations is instantly available. Write for full information on this great line of Sensitive Drilling Machines. Built in 1, 2, 3, 4, 6 Spindle Models.

**THE FOOTE-BURT COMPANY • Cleveland 8, Ohio**

Detroit Office: General Motors Building

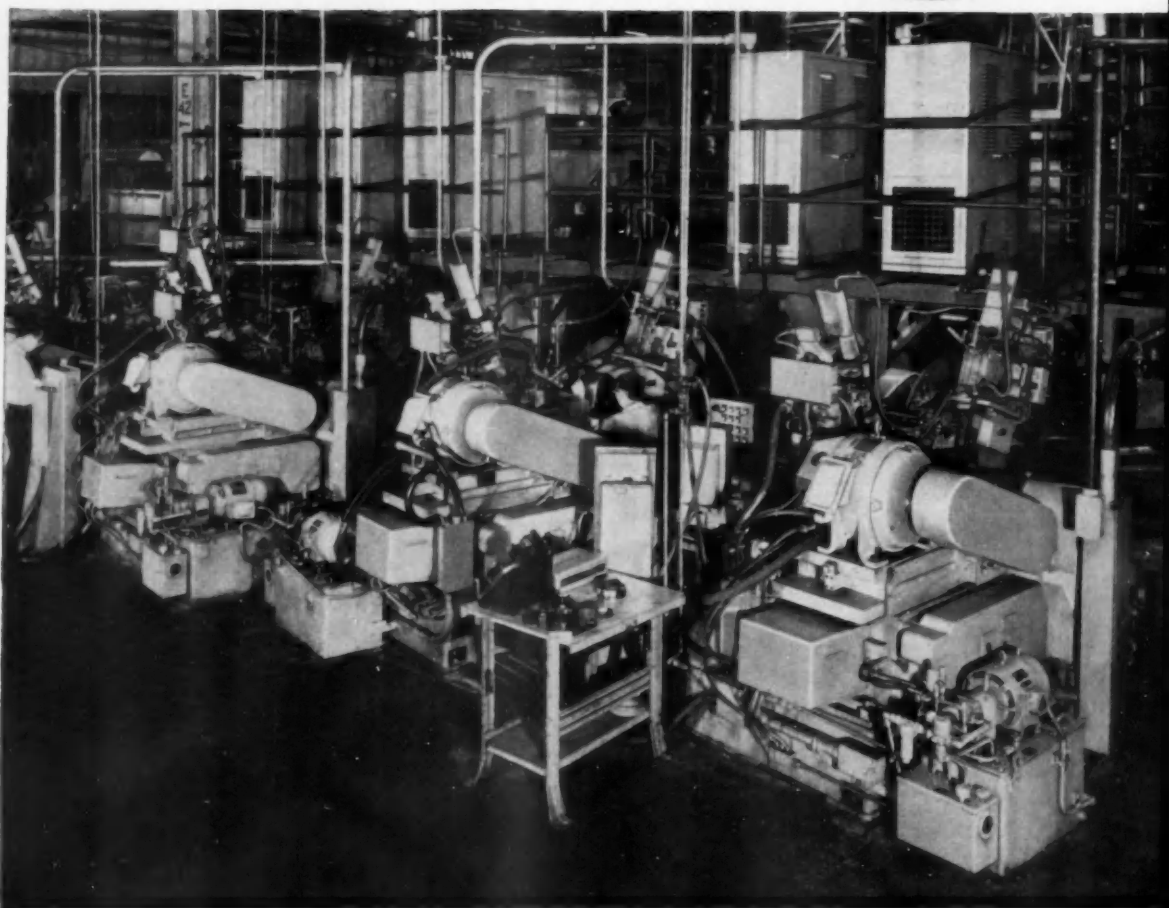


*Engineered  
for  
production*

**FOOTBURT**  
**MACHINE TOOLS**

# In this leading automotive plant...Norton Multi-Wheelslide Grinders

*Type CMS-1 Semiautomatics  
eliminate separate grinds  
on separate machines*



**A BATTERY OF NORTON TYPE CMS-1 GRINDERS.** Four of five Semiautomatic Multi-Wheelslide Cylindrical Grinding Machines in the Michigan plant of a big automotive manufacturer. Type CMS-1 machines may be set up with opposed wheelslides, as shown here, or wheelslides may be positioned in line if the job requires. Each wheelslide mounts one or more 30" grinding wheels. Slides operate in unison during production, but may be individually controlled for set up.

The Type CMS-1 Semiautomatic Multi-Wheelslide Cylindrical Grinder is a typical example of how Norton builds profit-boosting "Touch of Gold" advantages into grinding machine performance.

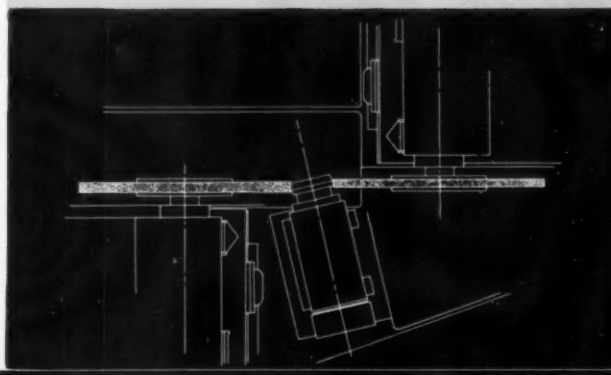
By grinding multiple diameters with top speed, accuracy and economy this ultra-modern machine easily replaces two or more ordinary grinders. Features like these tell you why:

- *Central, one-lever control of the automatic grinding cycle — plus automatic, electrically timed termination of the cycle — for greatly simplified operation.*
- *Two-rate automatic feed assures ideal conditions for rapid stock removal, with highest accuracy and finish.*
- *Convenient wheel feed hand wheels have "click-count" indexing, permitting feed adjustments in "tenths". This simplifies size control in setting-up and initial operation.*
- *Individual wheelhead mounted truing devices operate consistently at predetermined speed and feed. Control of abrasive removed is close and uniform, with compensation of wheelslide setting for wheel diameter reduction. The result is efficient, effortless truing, with reduced wheel cost per piece ground.*



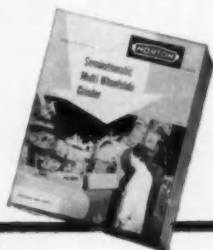
▲ **THE "TOUCH OF GOLD" IN ACTION.** A close-up of one of the Type CMS-1 Grinders in the larger photo. The job (shown schematically in the inset below) is grinding two bevelled 6" O.D.'s on an internal ring gear, with stock removal of .025". The fast production time on this operation is reported as follows:

**FLOOR TO FLOOR TIME:** 49 seconds, including load and unload. **Dressing Time:** 2½ seconds per piece, based on eight pieces per dress. **Total time, including dress:** 51½ seconds or 70 pieces per hour at 80% efficiency. ▼



### Improve Your Competitive Position

Replace your obsolete grinders with new high production, high efficiency Type CMS-1's — and meet competition with the best equipment in the field. Remember: only Norton offers you such long experience in both grinding machines and grinding wheels to help you produce more at lower cost. Ask your Norton Representative for Catalog No. 1800-1, or write to NORTON COMPANY, Machine Division, Worcester 6, Mass. In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5.



To Economize, Modernize with NEW

# NORTON

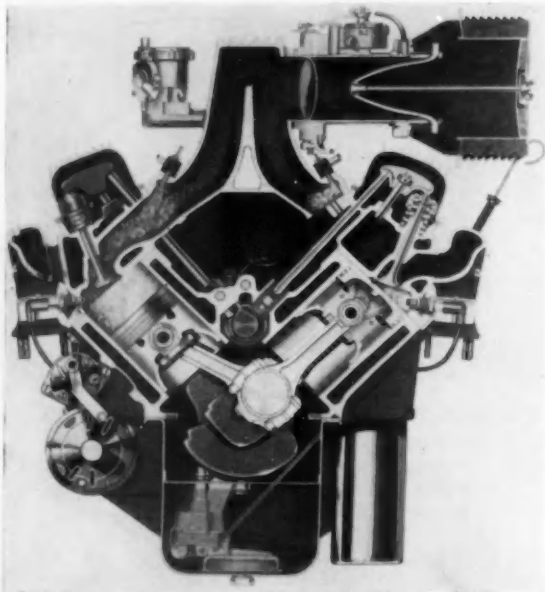
**GRINDERS and LAPPERS**

*Making better products...to make your products better*

District Offices: Worcester • Hartford • Cleveland  
Chicago • Detroit

NORTON PRODUCTS: Abrasives • Grinding Wheels  
Grinding Machines • Refractories

BEHR-MANNING PRODUCTS: Coated Abrasives  
Sharpening Stones • Behr-cat Tapes



Transverse cutaway view of the engine showing details of the fuel injection system

## Chevrolet Offers • • Fuel Injection

and performance advances as mentioned below in detail.

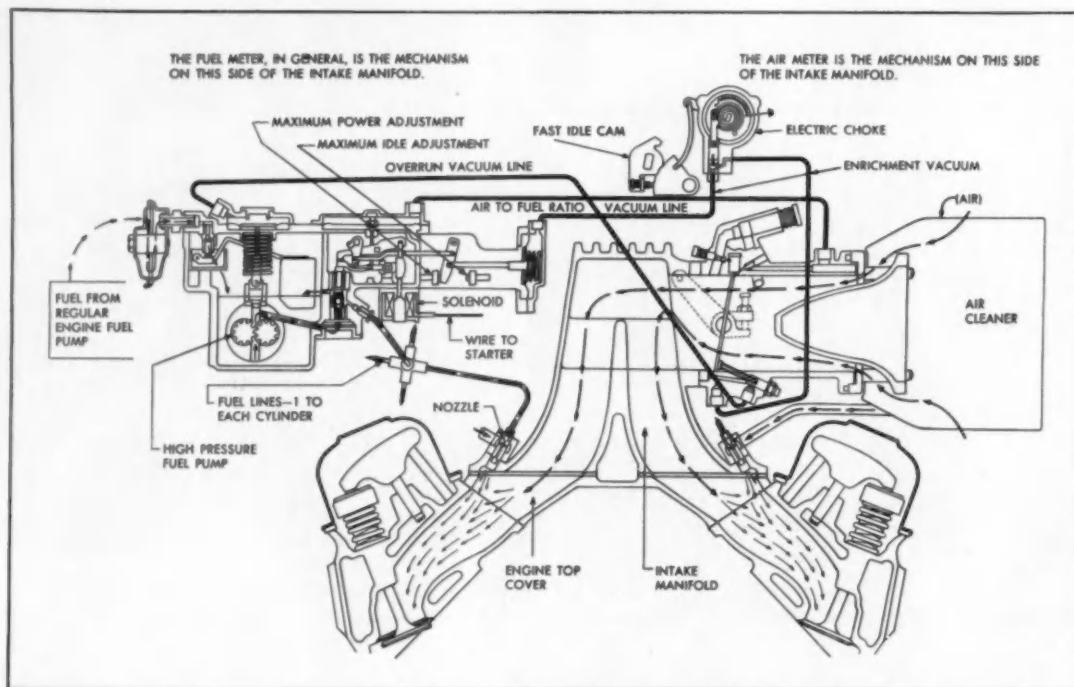
Engines offered in the 1957 passenger car line are one six and four V-8s. The six develops 140 hp. The eights range in horsepower from 283, 270, 250, and 245 for the "Corvette V-8" to 220 for the Super Turbo-Fire "283," 185 for the Turbo-Fire "283," and 162 hp for the Turbo-Fire "265."

Each of the engines is improved mechanically, but the gain in power—up from a peak of 225 hp in the 1956 line—is primarily due to larger bore, higher lift camshafts, and fuel injection.

With displacements of the six-cylinder and lowest cost V-8 remaining unchanged at 235 and 265 cu in., respectively, the more powerful eights have a displacement of 283 cu in. Bore has been increased one-eighth of an inch over the highest powered 1956 V-8 to a new 3.875 in. Piston stroke in all V-8s is three inches.

All high performance engines are based on the 283 cu in. block, while varying in fuel induction, compression ratio, camshafts and valving. Mechanical type valve lifters are used in the special high performance

**O**UTSTANDING features of the new Chevrolets will be fuel injection—available on the 283-hp Corvette engine—and a triple-turbine automatic transmission. In addition, the latest models present numerous styling



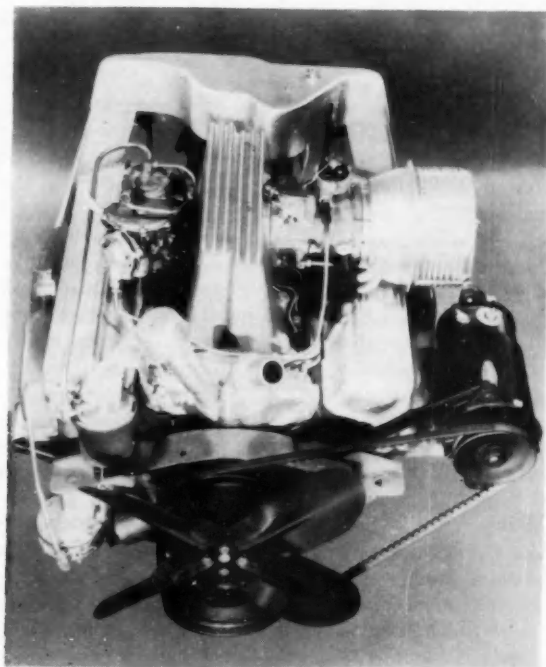
Schematic diagram of the fuel injection system

# and New Automatic Transmission

## for '57 Passenger Cars



1957 Chevrolet "Two-Ten" sport sedan



Fuel injection installation on 283 cu in. engine

engines with compression up to 10.5 to 1 with fuel injection. Fuel pressure lubrication to the valve lifter galleries replaces the former metered system on all V-8s. Full flow oil filters continue as a popular option, except on engines equipped with two four-barrel carburetors or fuel injection, where they are standard. Top deck of the V-8 cylinder block is increased in thickness for improved cylinder head attachment.



Ventilation intake screen is located above the headlamp

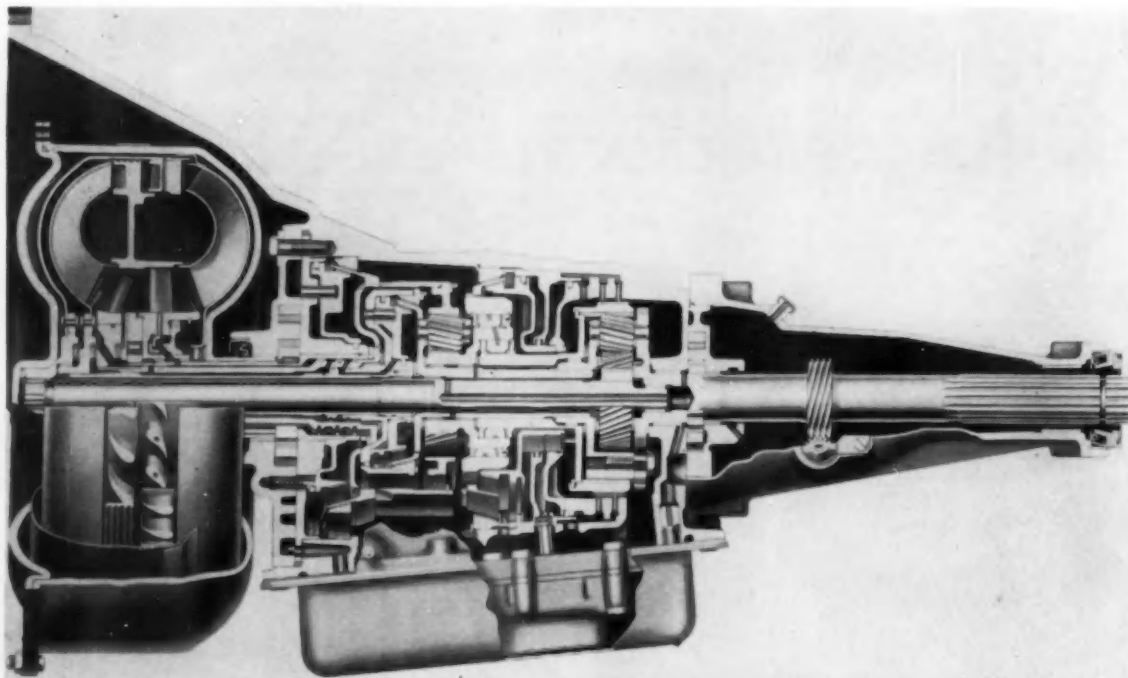
Spark plug electrodes protrude one-eighth inch farther into the combustion chamber, resulting in shorter flame travel. Starting motors of both six and V-8 have been modified to increase the efficiency of the solenoid.

Front and intermediate main bearings of V-8 engines are one-sixteenth in. wider, while connecting rod bearings and the front and intermediate main bearings of all Corvette V-8 engines are of an alloy which is said to triple average bearing life.

Notched pistons and dual exhausts are also characteristic of the high performance cars. In all V-8s piston rings have been revised for better compression and oil control.

Improved engine breathing and higher volumetric efficiency are claimed for new "ram's horn" exhaust manifolds on the V-8s. The new design provides larger gas passages which gradually increase in cross-sectional areas from the inlet port at the cylinder head to the outlet.

A new distributor is used on V-8 engines equipped with the two-barrel or four-barrel carburetors. This places the breaker points directly above the shaft



*Cutaway view of the new Turboglide transmission*

bearing. An access door in the distributor cap provides for the setting of the breaker gap while the engine is running.

In the Chevrolet fuel injection application, two separate castings replace the regular production intake manifold. The lower casting, made of iron, serves as the top cover of the engine while the upper aluminum casting mounts the air induction and fuel metering systems.

In operation, the accelerator pedal controls the volume of air and the air volume in turn determines the amount of gas delivered through the nozzles at each cylinder. A high-pressure pump, submerged in a fuel reservoir and driven by the distributor, supplies the force behind the fuel.

The pump delivers fuel to a metering chamber from which there are two outlets. The lower outlet leads to the nozzles and the upper to an overflow line. A plunger, sensitive to the flow of air in the system, meters the volume of gas directed toward the cylinders. Pressures at the 0.011-in. orifices of the nozzles measure up to 200 psi, inducing a fine spray into the intake ports. The explosion driving the piston is from this point accomplished in conventional fashion.

An over-run feature provides for the cut-out of fuel pressure when the car is going down-hill or decelerating. A vacuum-operated diaphragm located over the high-pressure fuel pump opens a valve, thus releasing the pressure and preventing the injection of fuel into the intake ports.

Augmenting the basic system, Chevrolet's fuel injector covers provisions for fast engine starting in cold weather through a solenoid check on the fuel

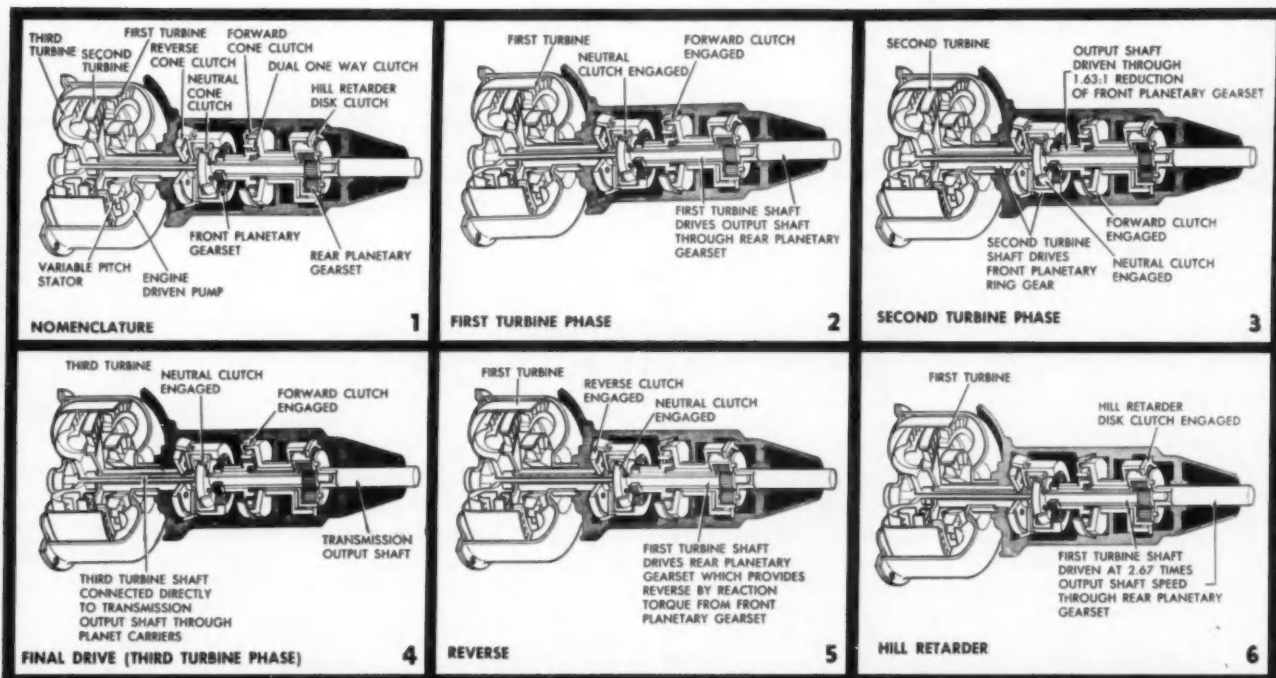
plunger and an electric choke. An oil-wetted air cleaner is used. The distributor is designed to permit timing adjustments without interference with the pump-driving mechanism.

Chevrolet's new Turboglide transmission is supplied only with the 283 cu in. engine. Elimination of all automatic shifting and a newly developed "hill retarder" are two of the innovations. According to Chevrolet, it provides nearly twice the torque multiplication delivered by standard torque converters. Another feature is the single forward driving position on the quadrant. This is possible, it is claimed, because the infinitely graduated torque multiplications from a standing start to highway cruising speed makes a step in the transmission unnecessary.

Mechanically, the new drive consists of three turbines and two planetary gearsets combined with a variable pitch stator and the conventional torque converter pump enclosed in a die-cast aluminum housing. Drive of the transmission output shaft results from a unique coupling of the turbines and the gears. As the turning force of one of the turbines lessens, another takes over to maintain a constant positive drive.

In the hill retarder position, a turbulence is created in the oil in the converter to impart a drag on the rear wheels. This factor is patterned after a similar device developed for the automatic truck transmission by Chevrolet.

There are 20 different models for the 1957 passenger car line-up. These are: Bel-Air—two- and four-door sedans, two-door sport coupe, four-door sport sedan, convertible, Nomad station wagon and four-door, six-passenger station wagon. Two-Ten—two- and



Operation phases of the Turboglide transmission

four-door sedans, two-door club and sport coupes, four-door sport sedan, two- and four-door, six-passenger station wagons, and four-door, nine-passenger station wagon. One-Fifty—two- and four-door sedans, utility sedan and two-door, six-passenger station wagon. Corvette—two-passenger sports model with manual or automatic fabric top or solid plastic top.

Overall length of the passenger cars is increased to a total of 200 in. with wheelbase remaining at 115 in. The hood is lower and the conventional hood ornament is replaced by twin lance-shaped windsplits. Headlamps are farther apart than in the 1956 models.

Front seat headroom has been increased in most models while front seat legroom has been added in all sedans and coupes.

### Higher Pounding of Stainless Steel Brightens '57 Model Cars

It is apparent as the wraps are removed from 1957 model cars across the country that automobile manufacturers have not cut back on the use of decorative trim. During the coming year, the industry anticipates stainless steel shipments even higher than those of 1955. This calculation is based on the increased use of stainless per car and the assumption that car output will be approximately the same as in 1955.

One informed industry source esti-

mates that, on 1957 models, Chrysler will use an average of 28 lb of stainless steel per car; General Motors, 33 lb per car, and Ford, 35 lb per car. As a result of this expanding use, the stainless steel producers expect fourth quarter mill shipments of stainless to be close to last year's fourth quarter, when such shipments hit an all-time high.

### Timken Pinpoints Reasons For Bearing Price Raises

Timken Roller Bearing Co. has come out with an interesting report

With the lower hood, windshields have greater visibility area than previous Chevrolets. The glass increase ranges from 69 to 75 sq in. through the model line-up.

A completely new ventilation system operates by air passing through intake screens over each headlamp. The air reaches the passenger compartment through louvered outlets at either edge of the dash. This system delivers up to 746 cfm of air at 60 mph while providing greater water draining capacity.

Fourteen-inch wheels and lower pressure tires (22 lb) are standard equipment for 1957. Powerglide, power brakes, power steering, and electric window lifts are again optional. Also available are the over-drive and a close ratio manual transmission.

giving reasons why it had to increase prices on its line of bearings. In the report circulated among the company's sales staff, Timken listed all the materials for which it has had to pay higher prices, and analyzed higher labor costs resulting from negotiations on a new contract.

The company has increased prices on its bearings by an average of seven per cent. Meanwhile, material costs have gone up 12 per cent; labor, eight per cent; and "expense items," five per cent, the company noted.

# Aluminum Automobile Radiators

By H. V. Menking

Director, Transportation and Machinery Section  
Product Development, Reynolds Metals Co.

CAN aluminum radiators replace copper? Can aluminum be soldered? How long will an aluminum radiator last? How can leaks be repaired? Why should we want aluminum radiators?

These are questions that the automotive industry's product development engineers asked themselves several years ago before they started to work on aluminum radiators. While the project is not yet concluded, their work has clearly demonstrated that aluminum radiators can replace copper. The next two years may see the first wide-spread use of an aluminum-finned, brass-tubed automobile radiator. It is possible that this composite radiator will quickly take over the field, or there may be a tendency to wait for the development of the all-aluminum radiator.

## Cost Savings

Aluminum radiators are wanted primarily because they offer a potential for sizable cost savings. Aluminum pig sells for 25 cents per pound while copper is 40 cents per pound. Since copper weighs 3.3 times more than aluminum, the cost of a cubic inch of copper is over five times that of a cubic inch of aluminum—in pig form. Aluminum and copper radiators are, of course, not made directly from pig, but are built up from rolled tube stock and fin stock and sheet for headers and tanks. When the prices of these products in aluminum and copper are compared, the difference is not quite so large as it was in pig, but it is still quite impressive. For instance, aluminum fin stock sells for about 52 cents per pound while copper fin stock sells for about 60 cents. Again recalling that copper weighs 3.3 times more than aluminum, it is a simple calculation to determine that a manufacturer has to pay over  $3\frac{1}{2}$  times as much for copper fin stock as he will pay for aluminum fin stock of the same length and the same thickness.

## Gages Must Be Increased

But can aluminum be substituted for copper, gage for gage? The answer is no, it cannot. The aluminum gages must be increased over conventional copper and brass gages for several reasons. Heat transfer capacity is a major reason, since aluminum has lower

thermal conductivity than copper. Ease of handling in soldering or brazing is another reason—since, at the elevated temperatures that are involved here, aluminum is not as hard and stiff as copper. And a third reason is probably a desire to play it safe. This is new territory, and the final answer as to how good the aluminum radiator is can only come from extensive service experience. In the meantime, it is surely a good idea to keep the aluminum gages a little on the heavy side.

How much thicker should the aluminum stock be? As a rule of thumb, aluminum tube and fin stock gages should be doubled over copper and brass. Aluminum fin stock is generally made about 0.006 in. instead of 0.003 in. in copper. Aluminum tube stock is made about 0.010 in. or 0.012 in. to replace 0.005 in. brass.

To look at a specific example in dollars and cents: A typical radiator contains about 11 lb of 0.003 in. copper fins at 60 cents a pound or a total of \$6.60. To do the same job in aluminum requires 6.68 lb of 0.006 in. aluminum fins at 52 cents per pound, or \$3.57. In other words, the cost of fin stock is almost cut in half and \$3.03 is saved. For the brass tubes and other brass parts, there is probably another \$2.25 potential saving in material cost, or a total of over \$5.00 per radiator.

Those are important savings. But before they can be realized, two questions must be answered. Number 1 is corrosion. Number 2 is, can an aluminum radiator be soldered, or put together in any other practical way? Even if copper were \$1/lb and aluminum 10 cents, the switch from copper to aluminum could not be made without the answers to these two problems.

## Corrosion Inside Tubes

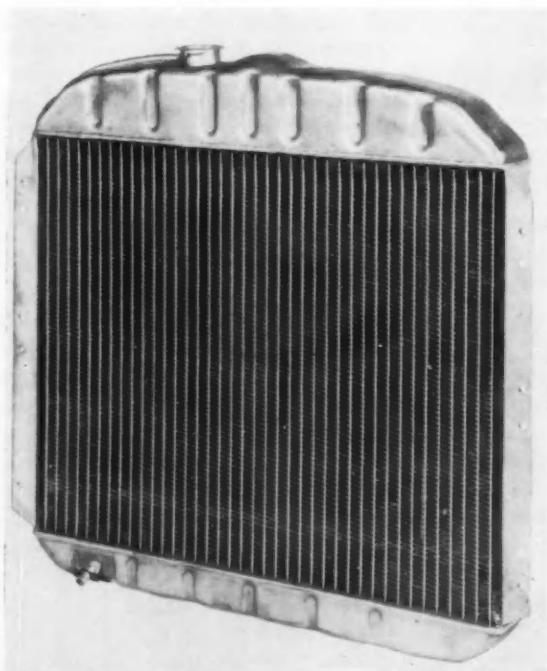
Actually there are not one but four potential corrosion factors. The first one, of course, is corrosion from the cooling water inside the water tubes. The evidence seems to indicate clearly that significant corrosion will not take place here if a special type of composite aluminum tube stock is used. In this particular case, the body or core of this composite tube stock would consist of 3003 alloy, the old 3S which has been a standby in the aluminum industry for over 60 years. But this core is coated or clad by

# Why and How Soon

a thin layer of another aluminum alloy which contains 2½ per cent zinc. This cladding alloy is anodic to the core alloy and therefore will protect it through galvanic action. That is, if corrosion attack occurs, it will concentrate on the thin layer of the cladding material, and the basic core material will not be attacked in the presence of cladding material. This is, in essence, galvanic corrosion, but controlled and harnessed for a useful purpose. This principle is known as cathodic protection. It is widely used in aluminum heat exchanger units of many types.

## Corrosion From The Outside

Factor No. 2 is corrosion from the outside; that is, corrosion from rain water, snow, and splashes of road salt, especially calcium chloride. A surface treatment of some type is undoubtedly necessary to prevent such corrosion. But there seems to be general agreement based on field experience that corrosion from this source is not a serious factor and can be controlled.



**Experimental Aluminum Radiator made for Chevrolet by Harrison Radiator Division, General Motors Corp., Lockport, N. Y. Radiator core was joined by dip brazing. Header sheets, tanks, side plates and fittings are also made of aluminum.**

Factor No. 3 is electrolytic attack in cases where aluminum and dissimilar metals are assembled in the presence of water. The answer here is to avoid such contacts, or to limit them to such dissimilar metals as are compatible with aluminum. Or if that can't be done, to rely on surface treatments to prevent corrosive attack. And finally, No. 4 is corrosion caused by residues of fluxes that were trapped during the soldering or brazing operation. From what is known today, this condition can be eliminated with proper flux, washing procedure and chemical surface treatment.

As a whole, the evidence as of today indicates that the corrosion problem in its various aspects can and is being solved. Some of the present solutions are in need of further improvement; but at least the problem is well on the way to being solved. Fortunately, aluminum has a tough oxide skin which is quite a big help in resisting corrosion.

## Removing Oxide Skin

While the aluminum oxide skin is an advantage in resisting corrosion, it is a disadvantage when soldering. The oxide skin must be removed, of course, before any kind of joining operation can be performed by fusion; that is, soldering, brazing or welding. When the aluminum oxide skin is removed, either mechanically or chemically, it begins to reform instantly unless oxygen is kept away from the surface. And that's where complications start because this requires an effective and aggressive flux—but at the same time this flux must be readily removable after soldering so it cannot cause corrosion.

Mainly because no such "tough but gentle" flux was available, the search for a practical method of soldering aluminum has baffled the industry for many years. So when aluminum started to come into its own after the last war, and some of the radiator manufacturers decided to give the aluminum radiator a whirl, they decided to by-pass soldering and to try brazing instead. The brazing process had been developed in the late 30's. By that time it had been used widely and successfully in aluminum heat exchangers.

## Brazing Radiators

In aluminum practice, there are two major differences between brazing and soldering. Brazing is done at a temperature of about 1100 F. Soldering is done between 500 and 800 F, depending on the solder used. In brazing, the filler metal which makes the joint is an aluminum alloy. In soldering, the filler metal is not an aluminum alloy, but an alloy of dissimilar metals,

*(Turn to page 178, please)*

# RAMBLER Offers 190-Hp, V-8 Engine

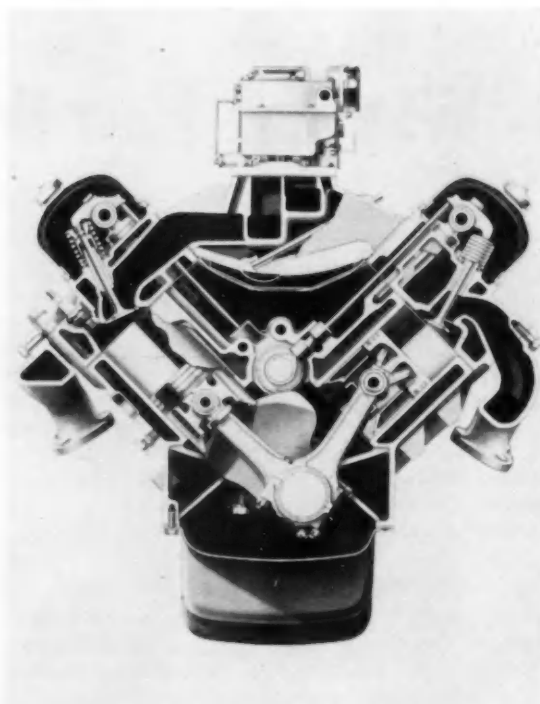
THE Rambler for 1957 will become a separate make of automobile. In the past the car was known as the Nash Rambler or Hudson Rambler, depending on which dealer sold it. The new V-8 series was added to fill out the line of Ramblers, which has become the basic volume car of American Motors Corp.

A V-8 engine, rated at 190 hp, will be available for the first time on the new Rambler. The "six," boosted to 125 hp, also will be offered. With an optional dual-throat carburetor, horsepower of the "six" will be increased to 135.

The new V-8 engine has a 250-cu-in. displacement. Its 8 to 1 compression ratio eliminates the need for premium grades of fuel. It has a two-barrel carburetor. Torque rating is 240 lb-ft at 2500 rpm.

The V-8 can be obtained with either a standard transmission, automatic overdrive or the Flashway Hydra-Matic. Dual mufflers and tail-pipes are standard on the V-8. The tail-pipes point downward and are hidden by the rear bumpers. A new cellulose-fiber air cleaner is standard equipment.

The 1957 Rambler six-cylinder powerplant incorporates a new variable-wedge type combustion chamber in combination with a new modified wedge-top piston.



Transverse section of the Rambler 190-hp, V-8 engine

This design provides an increased "quench" area and a more compact combustion chamber, with an increase in the compression ratio from last year's 7.47 to 1 to 8.25 to 1. A three-ring piston replaces the previous four-ring type. A new carburetor has been incorporated to further increase economy. Engine block has been strengthened with larger reinforcing sections.

## Engine and Power Train Specifications 1957 RAMBLER

### ENGINE

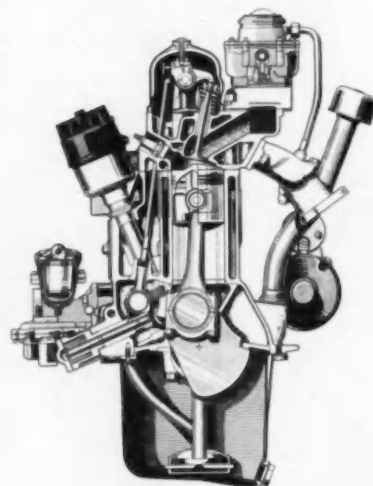
	6-Cylinder
Type	In-line six
Cyl. arrangement	Overhead valve
Bore and stroke	3 1/8 in. x 4 1/4 in.
Displacement	195.0 cu in.
Compression ratio	8.25:1
Max. brake horsepower	125 @ 4200 rpm
	135 @ 4500 rpm (opt.)
	175 @ 1800 rpm
	190 @ 1800 rpm (opt.)
Max. torque	Single throat
	Twin throat (opt.)
Type of carburetor (downdraft)	One
No. of carburetors	Five
No. of main bearings	Single
Exhaust system	

### POWER TRAIN

Transmission axle ratios:	
Standard synchromesh	3.77:1; 4.4:1 (opt.)
Overdrive	4.4:1; 4.1:1 (opt.)
Dual-Range Hydra-Matic	3.31:1
Flashway Hydra-Matic	
Type of drive shaft	Torque tube
Type of rear axle	Hypoid

### V-8

V-8 (90°-V)	
Overhead valve	
3 1/2 in. x 3 1/4 in.	
250 cu in.	
8.0:1	
190 @ 4800 rpm	
240 @ 2500 rpm	
Twin throat	
One	
Five	
Dual	



The six-cylinder engine which develops 125 hp or 135 hp with an optional dual throat carburetor



**This Super Cross Country is one of six station wagons in the 1957 Rambler line. It is the lowest price wagon, with the exception of the Deluxe station wagon offered as a fleet model.**

The 125-hp "six" has a displacement of 195.6 cu in. and develops a torque of 175 lb-ft at 1600 rpm. With optional twin-throat carburetor, the "six" develops 135 hp, with torque rating of 180 lb-ft at 1800 rpm.

Three types of transmissions are available on the "six." They are standard synchromesh, optional overdrive and optional Hydra-Matic. Wheel rims of the new Rambler have been widened a half inch, and wider tires, 6.70 by 15, have been added on V-8 models. The new tire size is optional on six-cylinder models.

Ramblers equipped with automatic transmissions have Selecto-Lift starting. The starter is activated by lifting the shift lever. The engine can be started only in the P (park) or N (neutral) positions. A vacuum lock-out system prevents the starter from being energized while the engine is running.

Thirteen models are in the 1957 line, six of which are V-8s. All are on a 108-in. wheelbase. The V-8 models are the Custom hardtop station wagon and hardtop sedan, Custom and Super station wagons and sedans. The "six" series includes the Custom and Super station wagon; Custom, Super and Deluxe sedan, and a Super hardtop. A Deluxe station wagon is available as a fleet model.

The front end has been redesigned to give the car a more massive appearance. A horizontal chrome bar has been added to the grille, and the parking-turning lights in the front fenders have been redesigned and increased in size.



**Deluxe four-door sedan, the lowest-priced model in the 1957 Rambler line. It is powered by the six-cylinder engine.**

Construction of the hardtops has been improved. The center sub-pillar, which ends at the top of the doors, has been strengthened by increasing the metal thickness. Also, the underbody and sides adjacent to the pillar have been reinforced for added rigidity, making the hardtop as solid as a regular Rambler sedan.

All-Season air conditioning has undergone a design change this year. It has a new compressor with a built-in muffler for quieter operation and a new receiver tank which functions to reduce leakage problems.

A safety package of padded instrument panel and padded sun visors is offered. Safety belts also are available. Safety door locks, which help prevent the doors from popping open in the event of a collision, continue to be standard equipment. Airliner reclining seats and twin travel beds continue to be offered on all Ramblers.

# Torque Control Tools in Ford Assembly Plant

**T**HE Ford Motor Co. automobile and truck assembly plant at Mahwah, N. J., is the largest assembly plant in the world. Almost half a mile in length and 792 ft wide, the plant provides forty acres of manufacturing space under a single roof. The plant started operations on July 16, 1955, and is capable of turning out 1080 cars and trucks per day when operating on two eight-hour shifts.

Early in 1956, shortly after the introduction of the Ingersoll-Rand torsion bar torque control Impactool, Ford put these new units to work on the assembly lines at Mahwah.

In three important operations, the tools used had not adequately coped with the problem of torque control, and the new type Impactools were introduced. In their first six months of operation, the tools have improved product quality in all these applications, and in one operation the Impactool not only eliminated a safety hazard but achieved torque control where no previous control had been possible with the use of conventional tools.

The torque control Impactool operates at full power and speed until nut-running resistance is equal to the stress preset in the torsion bar; then the impact mechanism rebounds instantly and trips a rubber-faced

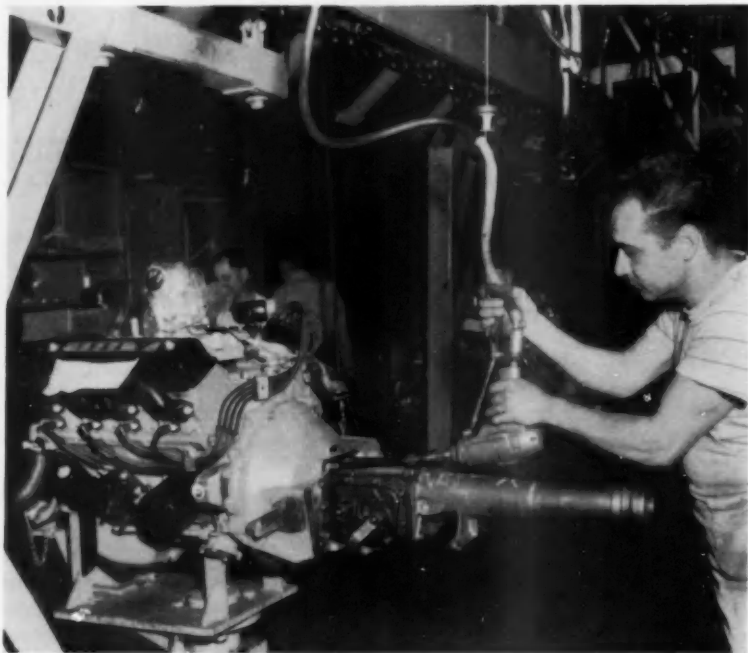
shutoff valve. The tools in use at Ford are the Size 5040T, a 6¼-lb tool available with either of two torsion bars, one with maximum torque of 60 lb ft, the other with maximum torque of 90 lb ft.

The most important application of the new tool of the Mahwah plant is securing the engine mount to the automobile body-frame cross member. In this pit operation, four ⅝-in. bolts are run to a 40-45 lb ft torque, two on each side of the engine mount, as the nearly-completed car passes overhead on the conveyor belt of the assembly line. The limited working space makes the job particularly difficult and tools must be equipped with an extension bar and universal joint to reach the bolts.

With a conventional air tool run to a stall, the operation was hazardous, since total applied torque was transmitted through the extension bar to the operator at an angle as soon as the nut tightened and before he could shut off the tool. With these tools torque varied considerably, frequently falling well outside the specified 40-45 lb ft range. Because of this, a 100 per cent check of hand torqueing was necessary to protect against sub-par quality.

In an attempt to correct this situation, a standard Impactool with the same attachments was employed. Although this tool did not transmit any noticeable torque through the handle to the operator, eliminating the safety hazard, it was impossible for the operator to control torque by timing the impacting. In fact, operators frequently stripped the bolts, running the tool longer in an effort to insure the required torque. Full hand torqueing was still required and replacement of stripped bolts was an expensive operation.

In the six months since the torque control Impactool was installed on this operation, it has achieved notable results. Applied to the job at full operating  
(Turn to page 136, please)



The I-R 5040T Impactool is shown here running one of the four bolts which holds a Ford transmission to the engine



The 1957 Lincolns feature new front end treatment and canted rear fender blades

## Two Models Added to Lincoln Line for 1957

**F**OR 1957 the restyled Lincoln line will include two additional models—four-door Landau hardtops in the Premiere and Capri Series. Sedans in both series have thin pillars, giving the appearance of a hardtop when windows are rolled up. Major exterior change in eye appeal stems from the introduction of Quadra-Lite front end styling for housing the four headlamps. Two are mounted on each side, one under the other. The upper pair are conventional sealed beam headlamps, the lower pair are 5¾-in. road lamps for additional highway lighting.

Overall length has been increased to 224.6 in. The cars retain the 15-in. wheels, using 8.00-15 tubeless tires, standard; 8.20-15 on convertibles and air-conditioned cars.

Front end treatment consists of a newly-styled combination bumper and grille, larger parking lights and directional signals. Blending into the ends of the rear bumpers, new oblong back-up lights keynote the distinctive rear treatment. An increase of 260 per cent in the back-up light area has been accomplished.

Canted fender blades originate well forward on the panel with a simulated air scoop. The large canted blades are climaxed by larger pyramid tail lights.

Exhaust pipes are concealed under the bumpers, eliminating the jet pod outlets.

New accessories in the 1957 Lincoln are power vent windows; a power-directed differential which prevents the car from being immobilized when one wheel is stuck in snow or mud; electric door locks operated from a master switch on the instrument panel; Adjust-O-Matic shock absorbers; and six-way power seat. A remote control sideview mirror and an automatic low-fuel warning signal are standard equipment. The fuel signal flashes red when approximately three gallons of gas remain in the tank.

Standard safety items with every car are the "deep dish" steering wheel, new non-reflecting horn ring, safety door locks, a suspended, extra-wide brake pedal

and a hooded anti-glare instrument panel. Also available are safety belts, a padded instrument panel, padded sun visors and electric door locks.

The 1957 Lincoln Premiere series has a standard equipment power steering, power seats, power windows and power brakes.

Although engine displacement remains unchanged at 368 cu in., ratings have been upped to 300 bhp at 4800 rpm, and 415 lb ft torque at 3000 rpm by an increase in compression ratio to 10 to 1 as well as other significant changes. Among these are: better breathing, a new distributor, redesigned combustion chamber, reshaped piston with 0.01-in. added to the height of the piston dome. Three-piece oil control rings now are used.

A new and more compact carburetor packs greater efficiency and features large volume float bowls. The distributor incorporates both vacuum and centrifugal spark advance. Another new feature is the Paper-Pak air cleaner which has the replacement type paper filter, said to provide 99.5 per cent efficiency.

To take care of increased electrical loads, Lincoln has adopted a high output generator of 40-amp capacity.

Steering and suspension have been further improved with the addition of Hydro-Cushion shock absorbers. A minor but important engine feature from the standpoint of maintenance is the adoption of self-locking tappet adjustment screws, making possible a one-wrench adjustment.

A new and smaller 12-in. torque converter with a steel housing replacing the former finned aluminum die cast housing, is standard in the automatic transmission. In addition, the oil cooler now consists of a separate radiator core section mounted directly in front of the radiator core.

Another new feature is a disposable oil filter unit which is screwed into the fitting, replaced readily by unscrewing as with a light bulb replacement.

# Latest Vehicles Displayed at Britain's Commercial Motor Show

By W. S. AMOS

**T**HE Commercial Motor Show, sponsored by the British Society of Motor Manufacturers, included vehicles produced by 40 international makers. The show, largest ever, was staged at Earls Court, London, from Sept. 21 to Sept. 29.

Design progress could be observed in many of the new exhibits. British manufacturers are at last pro-

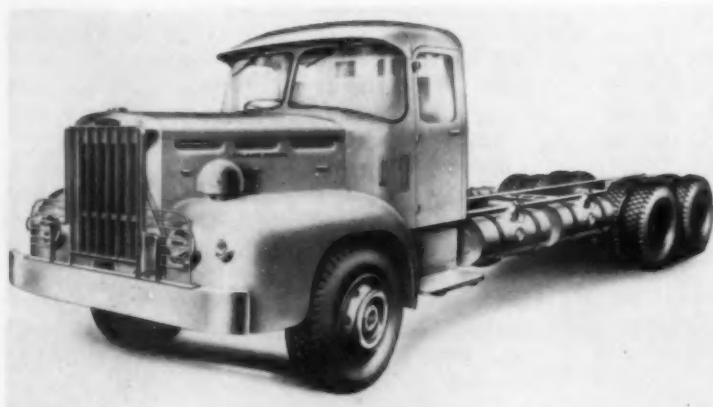
viding some measure of driving comfort. Power steering is now available in relatively light vehicles. Braking systems show improvement and have automatic adjustment. Two-pedal control is gaining popularity.

Rolls Royce for the first time showed a new torque converter built on license from the United States Twin Disc Co., and also a refined fully automatic gearbox. Most British commercial vehicle builders, however,

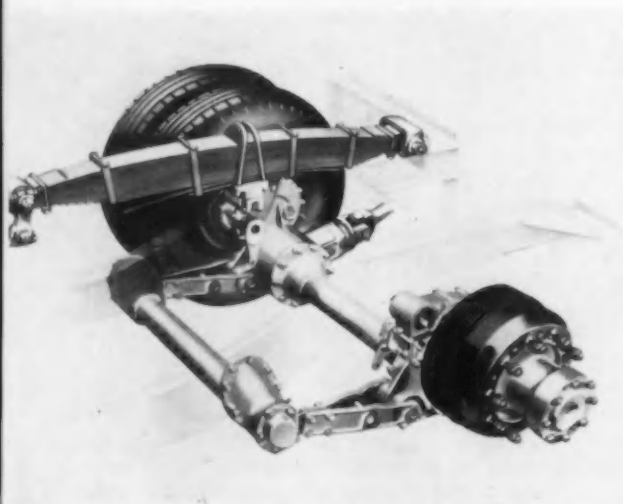
seem reluctant to adopt such transmission designs, preferring the finger tip control type epicyclic gear mechanisms which have pneumatic or vacuum servo assisted operating systems.

Other developments accentuate the trend toward weight reduction and the provision of maximum payload vehicles with relatively compact overall dimensions. Skillful application of light alloys and resin bonded glass fibre materials has brought an appreciable reduction of weight in some special designs.

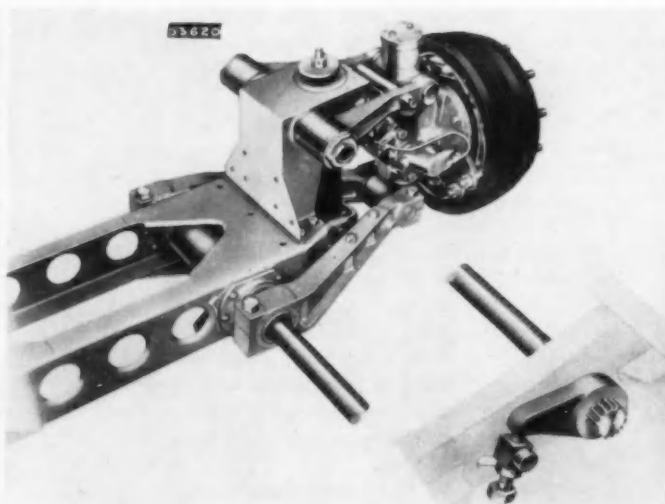
Two of the most advanced vehicles were shown by Crossley and Leyland. The new integrally constructed



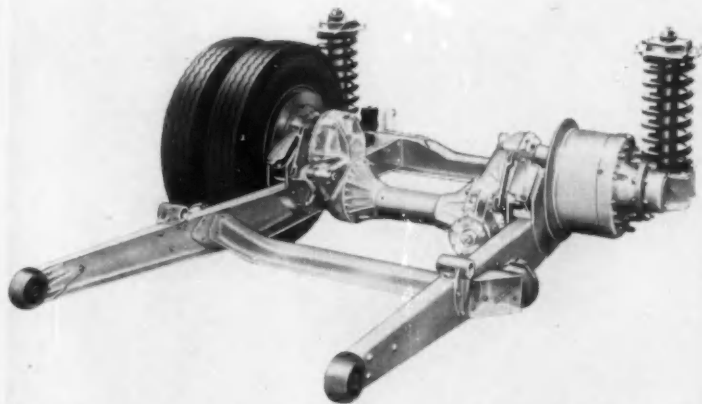
Leyland Buffalo six-wheeled chassis



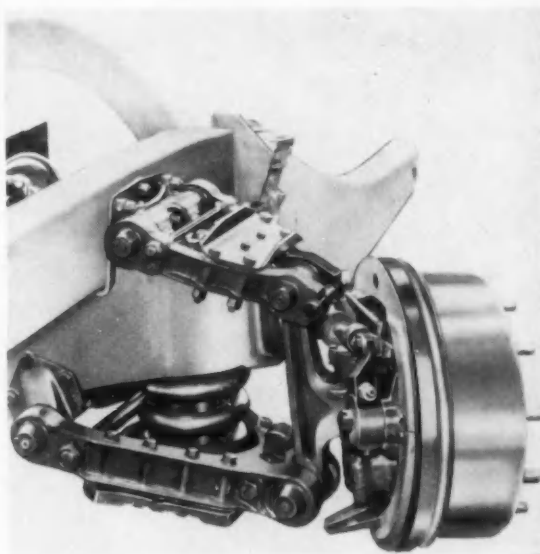
Rear suspension of the Leyland Atlantean which has variable rate springs



Independent front suspension of the Leyland Atlantean



**Above—Crossley Bridgemaster rear axle and rear suspension unit**  
**At right—Crossley Bridgemaster front suspension unit**



Bridgemaster double deck bus by Crossley is designed around two "wheelbarrow" units. At the front the complete engine, gearbox and independent suspension assembly comprises one unit. The rear "wheelbarrow" carries the coil-sprung, double-reduction axle assembly. Light alloys are extensively used in the integral body structure. The example at the show seats 72 passengers and overall weight is considerably less than eight tons.

The new Leyland Atlantean is of somewhat similar design, but in this case the 125 bhp six cylinder oil engine is rear mounted. This allows a completely flat floor in both upper and lower passenger compartments. The drive from the power unit is taken at an angle of 72 deg into the spiral bevel and helical spur gear, double reduction rear axle. The front wheel suspension is independent and uses double support arms and torsion bars.

Another Leyland product, the Buffalo six-wheeled truck chassis, incorporates an eight-speed pneumatic gearbox giving two-pedal control. This vehicle is powered by the Leyland 200 bhp Diesel, has a gross weight of 25 tons and uses power assisted steering. A third Leyland exhibit, the Comet-Scammell tractor, has the same engine and eight-speed gearbox unit as the Buffalo. Power steering is also standardized.

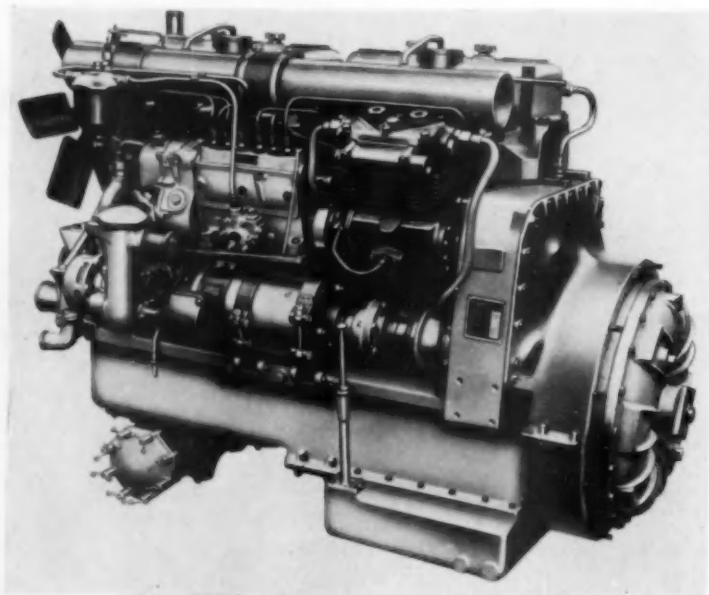
The A.E.C. division of Associated Commercial Vehicles showed an overseas Reliance bus chassis with five-speed synchromesh gearbox. The power unit is the A.E.C. AH470 six cylinder engine, which develops 112 bhp. The air brakes are augmented by a safety provision that gives in-

dependent air circuits to the front and rear axles.

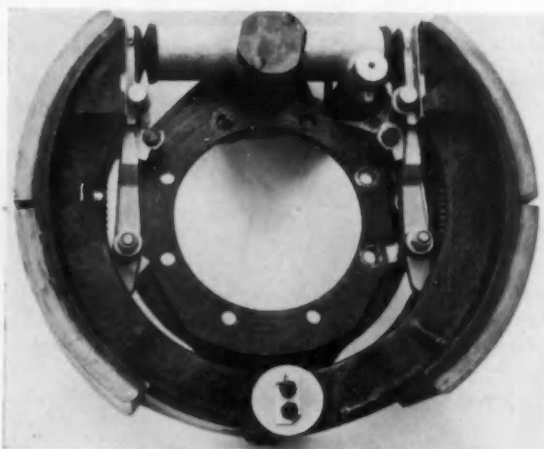
From the Glasgow Albion factory came a 15-ft wheel-base 100-hp Clydesdale chassis. Albion also produces an advanced underfloor-engine truck chassis, but company officials claim that certain export markets, notably in the Middle East oil fields, demand better accessibility for maintenance than the underfloor engine designs provide. Another vehicle, the Mann-Egerton Albion, was produced in cooperation with the development section of the British Aluminum Co. This vehicle uses Albion mechanical units and employs



**The Austin-B.M.C.  
seven-ton Diesel  
powered chassis**



**Daimler CD 650 vertical Diesel engine**



**Daimler strut-type automatic brake adjuster**

semi-integral construction principles. Apart from minor components, such as engine mounting brackets, etc., the whole structure is of light alloy. Further weight reduction is effected by using American Alcoa aluminum wheels and a Delaney Gallay light alloy radiator. High operating economy is claimed for this vehicle, which weighs only  $3\frac{1}{2}$  tons, and has a 16 ft, 11½ in. wheelbase.

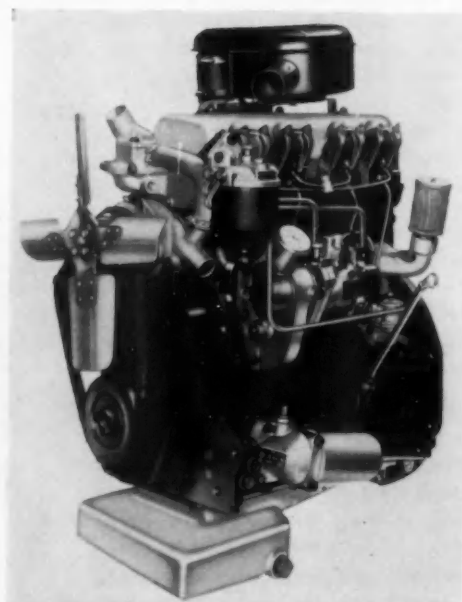
Two new light Diesel vehicles have been added to the Rootes Commer line. A new 2.2 litre Diesel power unit which develops 54 bhp at 3000 rpm and gives a net torque of 97.5 lb/ft at 2100 rpm is now offered in the Superpoise chassis. This engine will also be used in the lighter Karrier vehicles, but gasoline engines are still available. The Karrier Tractor, which is new to the

Commer line, is equipped with the Scammell automatic coupling gear, and air pressure hydraulic brakes are offered as an optional extra.

Among the Rolls Royce powered vehicles at the Show was the new Dennis Brothers F24 Fire Engine. The eight cylinder gasoline engine produces 160 bhp and is equipped with the Rolls Royce fully-automatic gearbox. Also Rolls Royce powered were various Scammell vehicles, although the new 24-ton articulated chassis has a 150 bhp Leyland engine and six-speed constant mesh gearbox. This vehicle is equipped with high pressure gas cylinders and with the new safety automatic coupling gear, which makes it impossible to drive off before the tractor and trailer units are properly coupled.

Standard Motor Co. showed its light Standard pick-up trucks and vans, which are equipped with the Newton centrifugal clutch, providing two-pedal control. This arrangement incorporates a vacuum servo and solenoid-operated mechanism which provides for clutch release when gear changes are being made. The clutch is released when a switch in the gear lever knob is actuated.

Daimler Co. is this year showing its new 30 ft chassis which complies with the latest Ministry of Trans-



**Commer/Karrier 4-cyl, ohv, 54-hp light Diesel**

port regulations. This vehicle is to be made available with the Daimler Fluid Flywheel transmission incorporating an air-operated, four-speed, preselector gearbox. Optionally available will be the new Twiflex centrifugal clutch which is claimed to give the positive non-slip characteristics of the conventional plate clutch. The new Daimler is offered with either Daimler or Gardiner engines.

The Rolls Royce manufactured Twin Disc torque converter is offered in several versions to suit power units from 60 to 600 bhp. The example shown by Rolls Royce was intended for installation in crawler tractor earthmoving equipment or in light railcars.

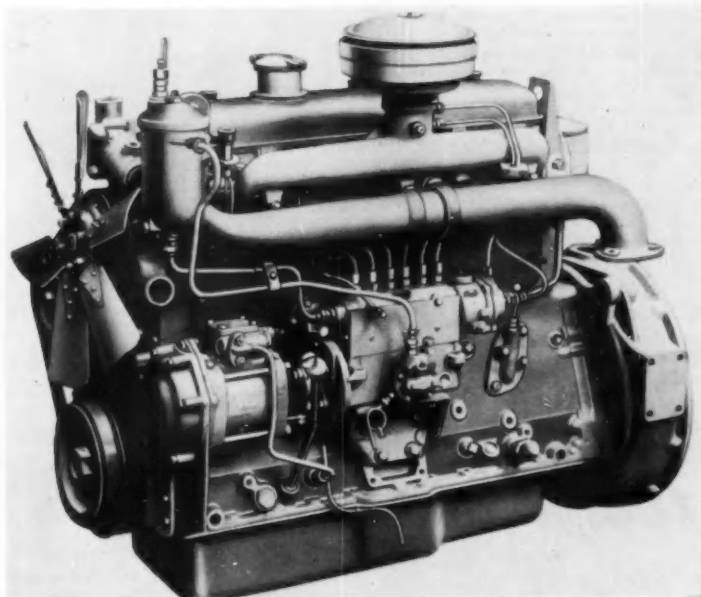
Two new models appeared on the E.R.F. stand, both with Rolls Royce Diesel engines. The export specification of the twin-steering, six-wheeled four cylinder chassis includes cam operated air brakes. The 200 bh tractor model is fitted with a 10-speed Road Ranger gearbox and has an exhaust braking unit as a standard equipment.

From the Austin/Morris British Motor Corp. organization came only one really new vehicle, the seven-ton short wheelbase Diesel chassis, which is offered with various truck type bodies. The power unit used is the B.M.C. 5.1 litre, 90 bh engine. Power assisted steering is fitted and also an Eaton electrically controlled, two-speed axle which, in conjunction with the four-speed synchromesh gearbox, gives eight forward speeds.

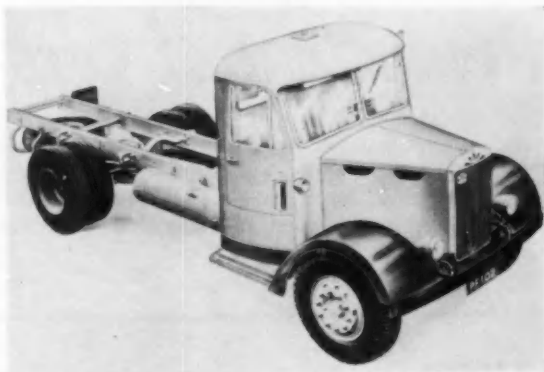
New from the Guy Motors Wolverhampton factory was the Warrior coach chassis with underfloor engine. The specification includes a five-speed overdrive gearbox and hydraulically operated clutch. The power unit is the Meadows horizontal four-cylinder Diesel, type 4HDC, rated at 90 bhp at 2400 rpm. This unit is fitted with a harmonic balancer.

Dodge Brothers (Britain) Ltd. new heavy duty chassis are available with gasoline engines and also with Perkins P6 Diesel units. Hydraulically operated clutch actuating mechanisms and a rubber cushioned transmission line are featured.

As an addition to the Thornycroft range the new Big Ben export chassis created much interest. This 6 x 6 heavy duty unit is a development of the original Big Ben four wheel drive chassis and is designed for a gross laden weight of 70,000 lb, or 112,000 lb with trailer. A turbo-supercharged version of the Thornycroft KR6 engine is installed in this vehicle. It produces 200 hp, maximum torque being 625 lb/ft at 1000 rpm. The exhaust driven supercharger is aircooled and weighs only 40 lb. The chassis weight of the new Big Ben is some 22,700 lb. Power assisted steering is fitted,



The 0.350 six-cylinder Diesel of 100 hp which is used in the Albion Clydesdale and Reiver models



New Clydesdale chassis with left hand steering

also air brakes. The main gearbox has four forward ratios, and an auxiliary box gives three further ratios. The bogie axles have hypoid drive gears and a secondary reduction is obtained via planetary gears within the wheel hubs.

Of very similar characteristics, but on a smaller scale, the new Unipower Centipede tractor has four-wheel steering, and has a turning circle of only 26 ft. Overall length of this vehicle is 15 ft, complete with cab and body. The Gardiner four cylinder, 5.6 litre Diesel gives a modest 75 bhp. A feature of this chassis is the use of Rzeppa constant velocity wide-angle joints, with fully floating spiral bevel drive axles front and rear.

Joining the ranks of those makers now using glass fibre materials, the Seddon Diesel Co. produced two new vehicles for the Show. The first was the Mark 15 forward control 12½ ft chassis. Power and transmis-

(Turn to page 176, please)

The process normally starts with a plaster female mold taken from a male master model. Lacquer is sprayed as a sealant over the plaster after it has been dried. The drying is done overnight in an oven at 135 F, or can be accomplished in a matter of minutes by pouring carbon tetrachloride over the plaster surface to create fast evaporation. After sealing, the surface is waxed and buffed smooth, and a parting agent is applied.



## Plastic Tooling for Prototype Production of Cars

Above right—Prior to casting, the plastic resin and hardener are thoroughly blended. If no foam core is indicated, the blend of Maraset epoxy resin No. 616 and accelerator is poured directly into the plaster mold. When a foam core is to be used, it is cast beforehand from a mixture of Marblette resin No. 1076 and hardener plus foam powder No. 1101. The cured phenolic foam block is trimmed to fit from within 1½ to 3 in. of the plaster mold's surface, is firmly fastened to the mold by a nailed board to prevent flotation, and then serves as a suspended core around which the epoxy mixture is poured into the cavity.

**T**HE advantages of plastic tooling have shown up particularly well in prototype production of automobiles, with savings of thousands of dollars

cited in just single phases of such programs by car manufacturers. Plastic tools are favored by tool and die shops serving the automobile industry because of

### Fruehauf Leases L. A. Plant For Guided Missile Operation

Fruehauf Trailer Co. will play an important part in the Government's accelerated guided missile program. Active for some time in research and development of a trailer fitted with electronic equipment for guided missiles, the company now is planning to concentrate all activities connected with such defense work at a plant it has leased in the Los Angeles area. The plant will be used for further development and manufacture of guided missile components.

Fruehauf's recent projects included designing and building of the launcher chassis and transporter for the Air Force's surface-to-surface tactical missile, the Metador; the navy's Regulus missile launcher; and trailers that contain the electronic brains for controlling flight of the

Nike rockets. In the last 15 years the company has built some 400 special vehicles for the armed forces.

### ARBA Road Show, Convention Scheduled for Chicago in '57

The 1957 American Roadbuilders' Association Road Show and Convention, to be held in Chicago's International Amphitheater from Jan. 28 through Feb. 2, bears every promise of being the greatest exposition of construction machinery, materials and methods ever assembled under one roof. Spread over 585,000 sq ft of space will be every type of machinery used for construction and maintenance.

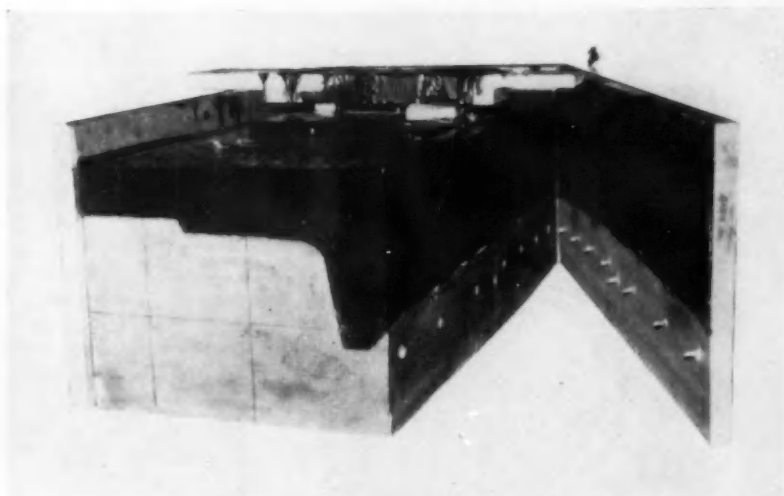
The last Road Show held in 1948 drew 63,000 visitors, but many more are expected to attend next year's event. Since the 1948 show, there have been a number of significant

improvements in construction machinery and developments that have altered the entire concept of road-building. Current interest in equipment is running particularly high because of the furious pace of highway building that will be accelerated still further by the new Interstate Highway Program.

### Hoover Bearing Seeking To Acquire Gerity-Mich.

Directors have approved the acquisition of Gerity-Michigan Corp., Adrian, Mich., by Hoover Ball & Bearing Co., Ann Arbor, Mich. Gerity, a manufacturer of such automotive products as radiator grilles, dashboard accessories, and ornamental hardware, last year had sales totaling about \$12 million against Hoover's \$17 million. Shareholders will vote on the proposal soon.

Whether the tool is constructed entirely of epoxy resin, or with a "prefabricated" phenolic foam core and epoxy face, the curing is accomplished overnight at room temperature — between 70 and 85 F. After this complete hardening, the next step is the removal of the frame holding the plaster mold and the plastic tool cast over it.



their simple equipment requirements, and their ready reclaimability, which permits quick and inexpensive testing and revision of designs.

As resin suppliers such as the Marblette Corp., Long Island City, N. Y., have collaborated with metal formers to develop resins particularly adaptable to specific needs, and with special properties such as abrasion resistance, the types of prevalently used plastic tools have expanded. Among these are hydroform blocks, stretch plugs, draw dies, and others.

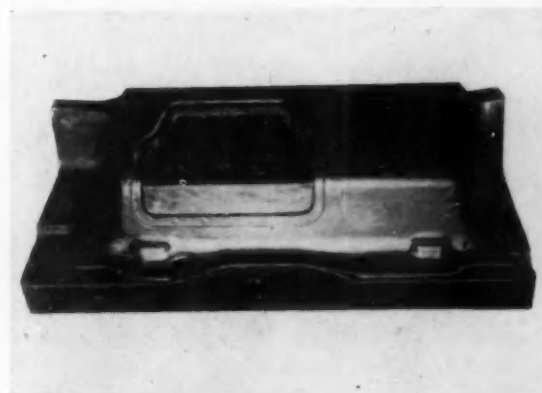
Successful applications of plastic tooling marks the experience of such a shop as Creative Industries,

Detroit. In addition to other plastic tools, Creative's sheet metal department is now fabricating lightweight hand hammer forms cast from Maraset epoxy resin No. 616, a room-temperature curing formulation recently developed by the Marblette Corp., and on large forms, is further reducing tool weight with a core of Marblette phenolic foam resin No. 1076.

The simplicity of the fabrication method for these tools—used to shape such metal parts as automobile fenders, dash panels, and inside door panels—is shown in these illustrations of successive stages in tool production.



Because the plaster mold had been thoroughly waxed and covered with a parting agent, it becomes a simple matter to separate it from the epoxy hand hammer form. Since shrinkage is practically nonexistent, barbering of the finished tool — which would be required for a metal hammer form—is not necessary before putting the tool to work.



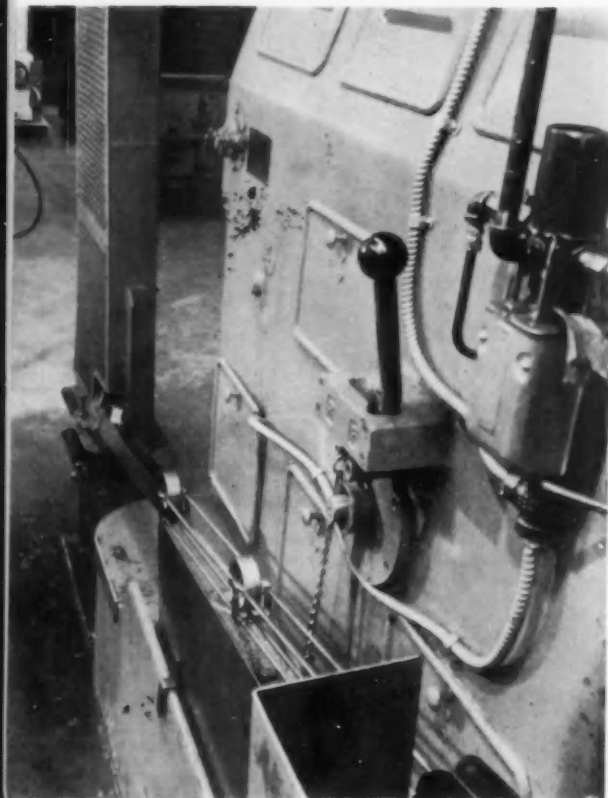
Diversification in the method of producing plastic hand hammer forms similar to this one often takes place at Creative Industries and other shops. One variation is to lighten tools and lower their costs by mixing dry foundry slag with Maraset epoxy No. 616 and the hardener in the plaster mold, instead of using a foamed core. For tools with sharp contoured edges, or longer runs, a face that will stand up to stringent wear is made by casting resin No. 616 into a laminate built up an eighth of an inch with Maraset laminating resin No. 602 and epoxy gel coat resin No. 613. Exceptionally sharp contour can also be provided by locking in place in the mold precision-cast metal inserts around which the resin is poured.

# Chevrolet Rear



**FIG. 1** General overhead view of compact integrated department for producing inner and outer races for rear wheel bearings. It emphasizes the close spacing of machines, the system of automatic conveyors overhead with chutes leading to each of the machines.

**FIG. 2** First step in the process is the blanking of inner and outer races in a battery of six-spindle National Acme-Gridley automatic bar machines. Each machine ejects parts on chutes such as the one seen here, then upward on the elevator at the left.



**O**RIGINATOR of the familiar phrase, "Nothing Rolls Like a Ball," New Departure Division of General Motors Corp. has just completed reorganization of the major high production department in its Sandusky, Ohio, plant, featuring the most advanced techniques of mechanization for making 1957 Chevrolet rear wheel bearings in a fully automatic cycle from the start of the cycle in National Acme-Gridley bar machines to the final assembly, testing, and packaging.

This represents the latest improvement in techniques since the Division recast its entire method of producing ball bearings in fully integrated departments, several years ago.

To this writer the changes made in Sandusky are particularly exciting since we were fortunate in recording the arrangement of the plant and its facilities after it first opened for business (see AI, August 1, 1948). At that time it was heralded as the most advanced ball bearing plant in the industry, capable of producing some 1,500,000 bearings a month.

Introduction of integrated departments—in which each type of high production automotive bearing is produced in a self-contained department—has lifted the level of the art far beyond the conception of the specialists only 10 years ago. It may be noted, too, that the manufacture of bearing balls also has come a long way. This will be evident when we describe, in a later issue, the integrated line for making 7/16-in. balls for the rear wheel bearing assembly.

Unlike most of the mass production studies presented in recent years, this one will be largely pictorial to facilitate an appreciation of the variety of automatic con-

## PART I

veyors, elevators, and feeder mechanism responsible for the virtual elimination of parts handling in an entire manufacturing department.

A lot of things have happened since the Sandusky plant opened. The most important is a change in manufacturing philosophy. Initially, it was common practice to forge the inner and outer races and machine them individually in chucking machines. Current practice has turned to the machining of both races from 52100 tube stock in high-speed bar machines. With this change most of the forging department was eliminated, thus releasing valuable floor space. When this was followed recently by the development of compact integrated departments, it resulted in so much productive space saving as to make it possible to introduce hundreds of large new machines and greatly increase the output of ball bearings without necessary

# Wheel Bearings

*made in*

## **AUTOMATIC CYCLE**

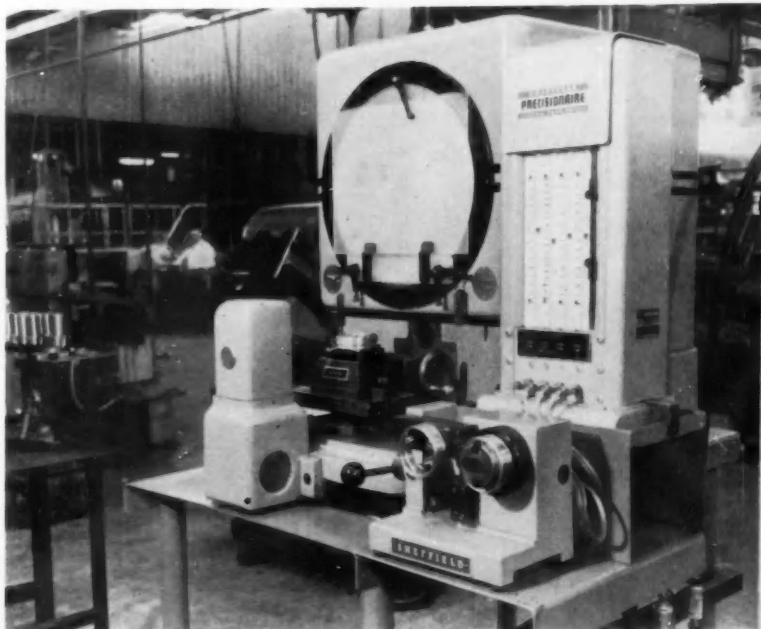
**By Joseph Geschelin**

recourse to expansion in any way.

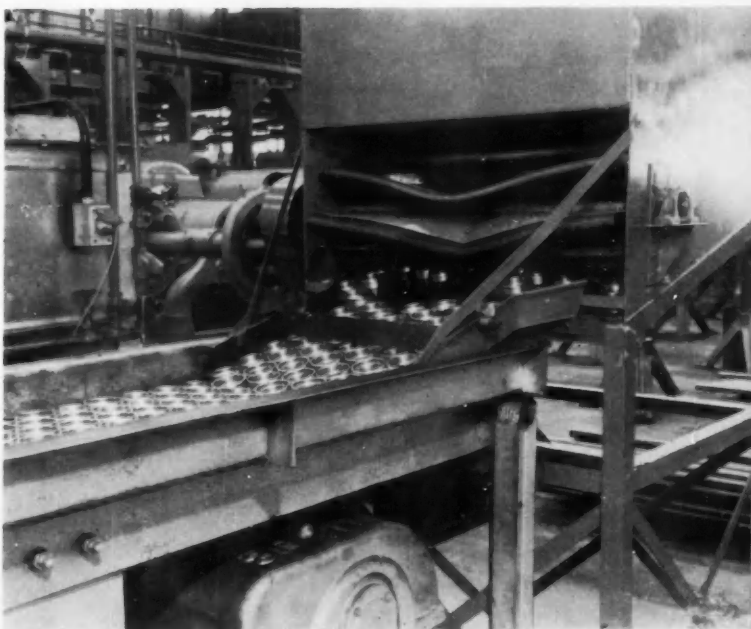
Most important, however, is the fact that the new procedures have resulted in closer control of the process—tighter dimensional tolerances, finer surface finishes, and a better customer product.

Let us consider first the nature of the integrated line. Some impression of the compactness of the department discussed here may be gained from Fig. 1 which is an overhead view of a portion of the line. The various items of equipment, including Heald internal grinders, may be seen grouped together closely with all of the machines tied together into a unified line by means of the conveyors overhead, such as the one in the center and the two lines to the left. Parts transported on these conveyor lines feed to individual machines by means of the lateral chutes and vertical "dribble" chutes. This view shows the general arrangement.

Now let's start at the beginning of the line. Both the inner and outer races are blanked in a battery of National Acme-Gridley six-spindle bar machines. Fig. 2 shows the outer races rolling out of a bar machine to the elevator at the left. At the cut-off station of the machine the blank is picked off by means of an air-operated mechanism and dropped into a chute. The chute, incidentally, is located quite some distance away from the work station to avoid carrying out chips and coolant. Hence, the reason for the pick-off bar. In the case of inner races, the machine produces two pieces at a time, with cut-off stations on both sides of the machine. Here they have provided



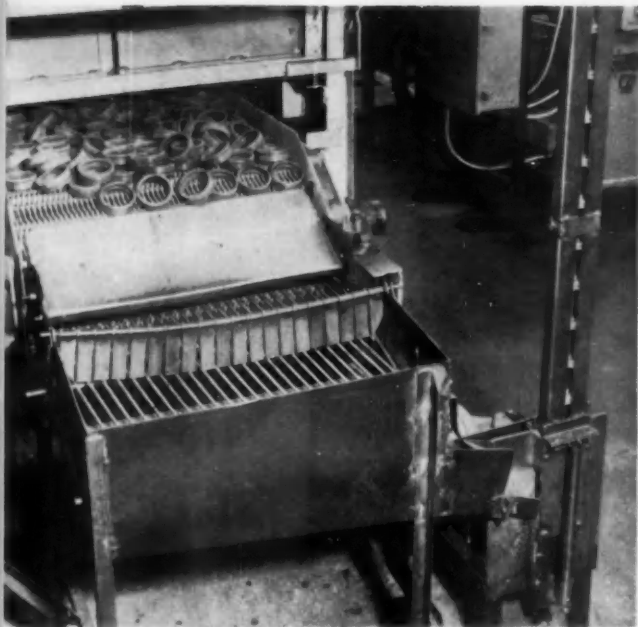
Quality control of bar machine production is exercised by means of sampling of parts by machine operators, checking being done in gaging packages such as the one seen here. At the left is a Kodak optical projector; at the right is a Sheffield Precisionaire gage. FIG. 3



Closeup of a typical accumulator, or storage hopper, fitted with a rubber-tipped, herring-bone type rotor. Here the hopper is distributing parts on the apron leading to a Surface Combustion heat treating furnace. FIG. 4

two pick-off bars and have ejection chutes on both sides of the machine.

The first example of rigid quality control is found at



**FIG. 5** Exit end of Surface Combustion draw furnace. The parts move out on the chute in the foreground and upward by elevator to the next operation.

this point. Figure 3 shows a typical operator inspection station, provided with a Kodak projector and Sheffield gage. Each operator is required to sample the parts coming out of the machines to make sure that standard conditions are maintained and that the tooling is right.

Eventually the outer races reach a large Sheffield gaging machine, operating automatically, for checking the OD, race width, race location, and groove location.

**Near Right—**

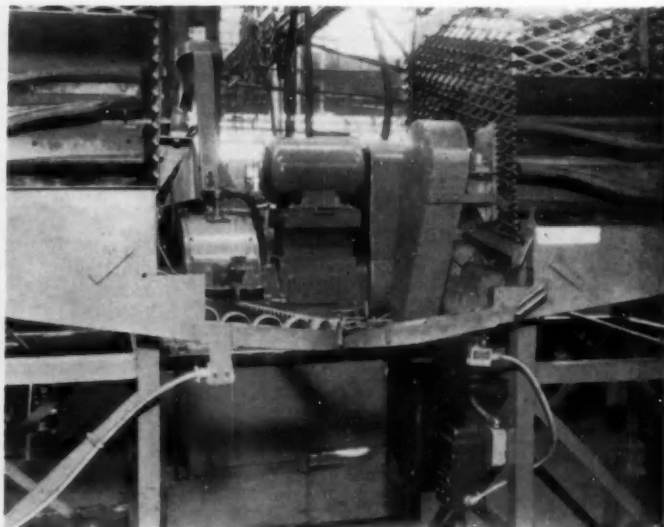
Bore of inner races is ground in Heald Centri-Matic internal grinders. Parts come in on the conveyor chute overhead, drop down the dribble chute. Finish ground parts come out on the chute in the foreground and go through the automatic Sheffield gaging station at the left.

**Middle Right—**

Ball race on the inner race is ground in Cincinnati grinders, using a formed wheel. Work enters the machine via the curved slow-down chute in the center, leaves by the chute leading through the automatic gaging station.

**Far Right—**

Close-up of one of a large battery of outer race internal ball race grinders, designed and built by ND. Work enters by means of the vertical dribble chute, leaves on the curved chute in front for gaging. The mechanism of the extreme left is the feedback device for resetting the wheel after two successive pieces have failed to pass the gage.

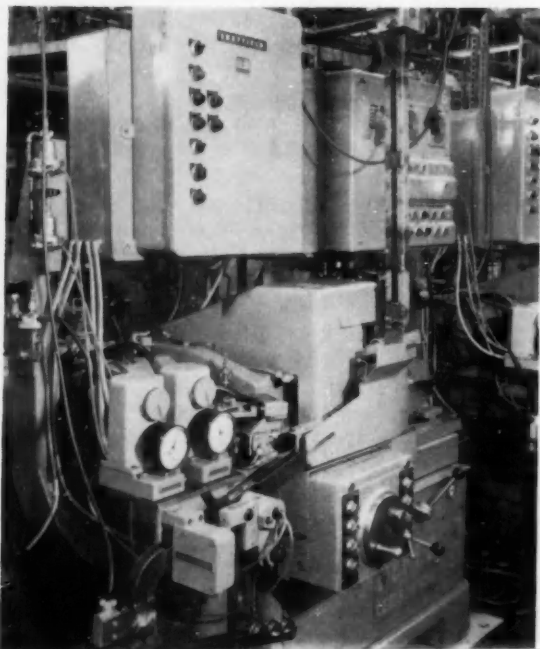


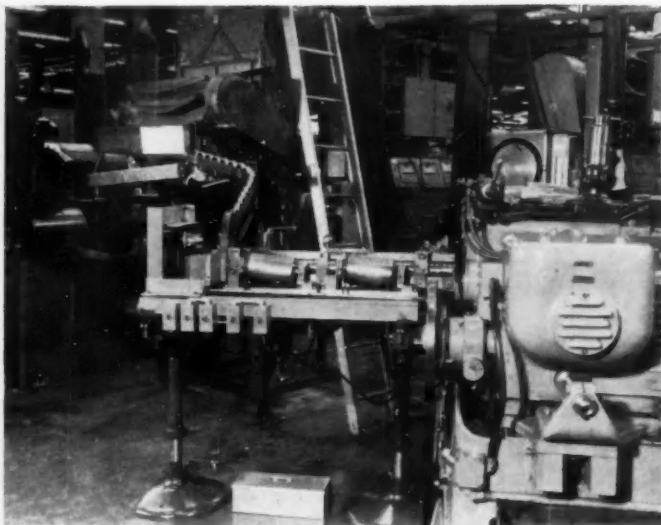
**FIG. 6** Gardner double-end surface grinder grinds the sides of inner and outer races to size and fine surface finish. Outer races are stored in the hopper at the left; inner races at the right, both moving by chute to the loading mechanism for the machine.

Accepted pieces are ejected into a conveyor for delivery to succeeding operations.

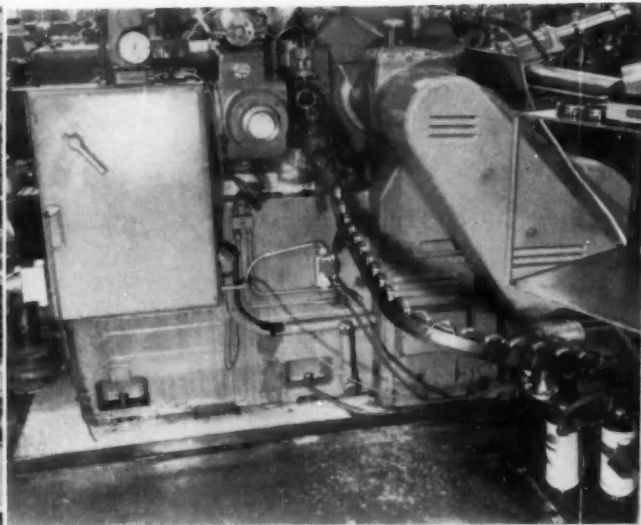
Before going to heat treat, the outer races come down a section of gravity conveyor, mounted overhead with a gentle slope and feeding to the special stamping machine which stamps the identifying legend on the side of the race. It is noteworthy that the new stamping device consists of an adaptation of the familiar Hannifin hydraulic squeezer, in this case a small unit contained within a box. Coming out of this machine the parts drop down to an elevator, thence through a washer, and finally onto a conveyor leading to heat

**FIG. 9**





**FIG. 7** Outer races, stored in the hopper at the left, are delivered by chute to the No. 3 Cincinnati Centerless grinder for OD grind. Two pairs of rollers align parts and move them into machine.



Gaged automatically, outer races are seen coming out of the Cincinnati Centerless. Note the configuration of the FIG. 8 chute to change the position of work for feeding to the succeeding mechanism.

treat. On the way to heat treat, the conveyor traverses an overhead mounted box containing two photocells for counting. This counter provides an accurate check of the accepted races issuing from the bar machines.

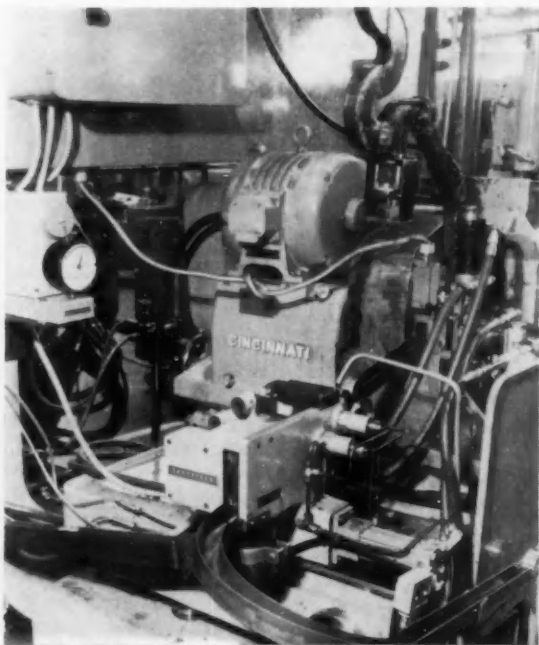
Two Surface Combustion atmosphere controlled furnaces handle the heat treatment of races. Parts are delivered by conveyor to an accumulator, such as the one shown in Fig. 4, then are fed out onto the apron conveyor leading to the shaker hearth. Secret of smooth, efficient operation at this point is the arrangement of the rubber-tipped, herringbone type rotors that feed and distribute the parts.

Parts are automatically quenched in hot oil bath, go through a washer, then through a Surface Combustion draw furnace. As the parts come out of the latter they drop into a chute leading to an elevator as shown in Fig. 5, ready to move to the next station.

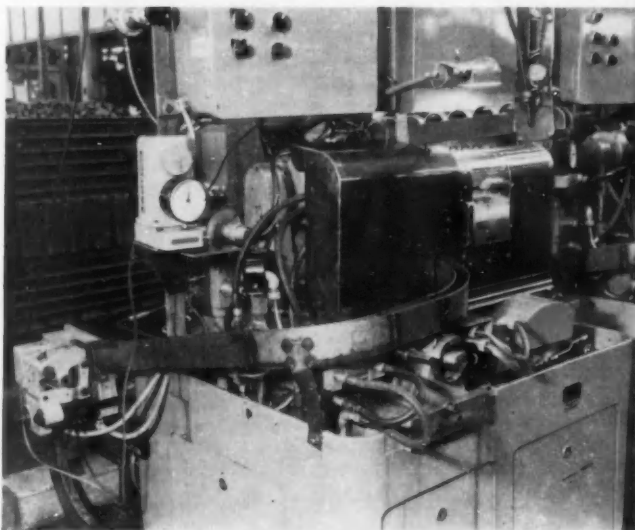
Both inner and outer races now are collected in accumulators on each side of a No. 125 Gardner surface grinder, Fig. 6, and are fed in on chutes from both sides. Since both races are of the same width, they are handled in the same machine, thus simplifying handling materially.

(Turn to page 190, please)

**FIG. 10**

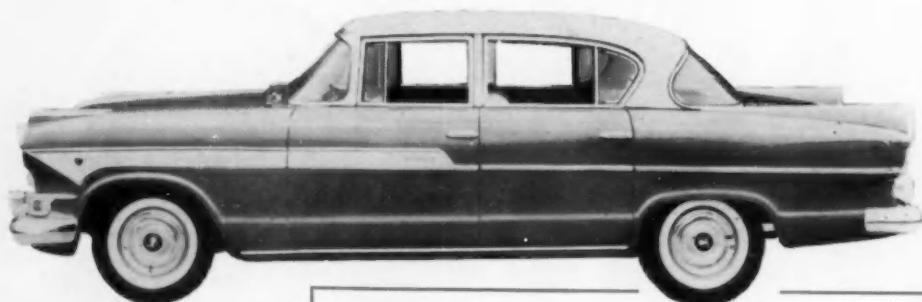


**FIG. 11**



# The Hudson Hornet V-8 Series

## for 1957



*Hornet super  
four-door sedan*



*The kingpin type front suspension has been replaced by a steering knuckle assembly which pivots on anti-friction bearings*

**H**UDSON Motors' 1957 Hornet V-8 series is highlighted by a new 255-hp engine and many styling refinements. The Hornet V-8 series is available in super and custom four-door sedan and two-door Hollywood hardtop versions.

The Hornet 255-horsepower V-8 engine has a compression ratio of 9.0 to 1 and a 327 cu in. displacement. Its bore and stroke are 4 by 3½ in. A four-barrel carburetor and dual exhausts are standard equipment with this engine.

Three transmissions: standard synchromesh, optional automatic overdrive, and the improved optional Flashaway Hydra-Matic are available. The Flashaway automatic transmission incorporates many new improvements for smooth and silent shifting in all ranges. The Dual-Range feature has been retained, and a new Park position has been added.

Modern rear fender fins are among the

### Condensed Specifications—1957 Hudson Hornet Series

#### ENGINE

Type	V-8 (90°-V), Overhead Valve
Bore and stroke	4 in. x 3¼ in.
Displacement	327 cu. in.
Compression ratio	9.0:1
Max. brake horsepower	255 @ 4700 rpm
Max. torque	345 @ 2600 rpm
Type of carburetor	Down-draft, four barrel
No. of carburetors	One
No. of main bearings	Five
Exhaust system	Dual

#### POWER TRAIN

Transmission axle ratios:	
Standard synchromesh	4.1:1
Automatic overdrive	4.1:1
Flashaway Hydra-Matic	3.15:1
Type of driveshaft	Torque tube
Type of rear axle	Hypoid

#### RUNNING GEAR

Type of springs	Coil, all 4 wheels
Type of front suspension	Direct acting, independent
Type of brakes	Duo-Servo hydraulic
Brake diameter	11 in.
Effective brake area	197.86 sq in.
Tire size (tubeless)	8.00-14
Overall steering ratio	25.4:1
Overall steering ratio (with power steering)	23.1:1

Hudson's styling refinements for 1957. Dual-fin front fender ornaments complement the lines of the new models.

A new silver textured aluminum panel on all custom models extends from the front fenders into the front door panel on both sides of the car.

The V-shaped, die-cast grille rounds out Hudson's exterior

styling. The grille is accented by a new V-type emblem in the center.

Built on a 121¼ in. wheelbase, the Hornet is two inches lower for 1957, giving it an overall height of 60¾ in. The new models are equipped with 14-in. wheels, and the roof panel has been lowered 1¼ in. at the center-line.

Dual exhaust tailpipes are standard equipment on both super and custom Hornet models. Both tailpipes point downward and are hidden by the bumper to prevent blackening of the chrome by exhaust fumes.

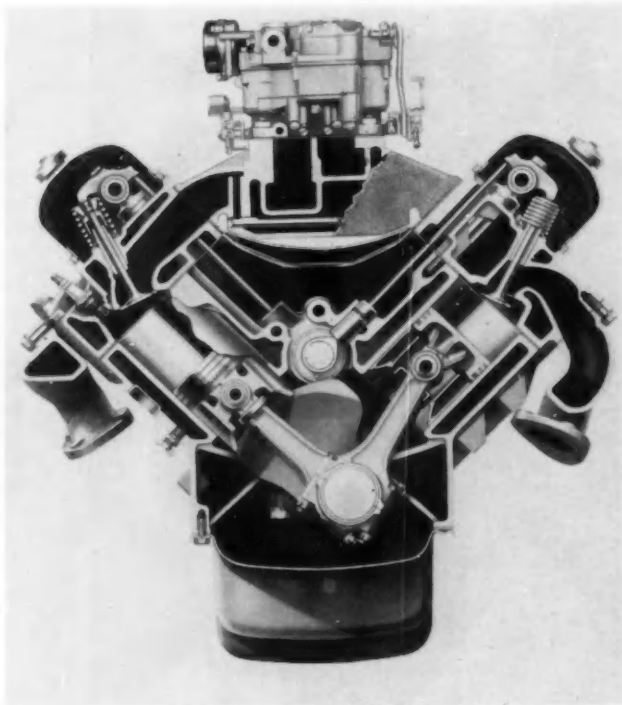
The 1957 Hornet series is equipped with new 8.00-14 tubeless tires. The front tread has been changed to 59 1/16 in. The kingpin type front suspension has been replaced by a steering knuckle assembly which pivots on anti-friction bearings, thus making the steering easier and smoother.

Padded instrument panels are standard on both super and custom Hornet models, and padded sun visors are standard on custom and optional on super models.

An improved "airliner reclining" seat and twin-bed combination is offered as standard on custom models and optional equipment on super models.

The "All-Season" air conditioning system, offered as optional equipment, has been improved in Hudson's 1957 models. This system combines heating, ventilating and refrigerating in one unit, operated by a single knob control. The Weather Eye heating and ventilating system, with hood-high fresh air intake, also is offered.

Power assists offered on the new models as optional extra cost equipment include power brakes, power



*The Hornet V-8 engine which develops 255 hp. It is built in AMC's Kenosha, Wis., plant*

steering and electric power-lift windows. Power brakes are standard on custom models.

Hudson's Triple-Safe brakes are standard on all models not equipped with power brakes.

• • •

## **All Car Companies Back in Swing on '57 Models**

Now that the automobile companies are in production on 1957 models, output during the next several weeks will be watched with considerable interest. It appears certain that 1956 will turn out to be the fourth best production year on record, if not the third.

Car production through the end of September totaled 4.2 million units. It is estimated that output in the October-December quarter will total between 1.7 and 1.8 million cars to bring the year's total production to around six million units.

If output tops the 6.1 million mark, 1956 could end up as the third best year. This is not very likely, however, in view of the fact that several companies were still in the model

changeover stage earlier this month. Output in the coming weeks would have to be increased substantially above present schedules to give the industry more than six million cars for the year.

New dealers are going into the 1957 model selling season in the best

shape on inventories since 1954 in relation to stocks. Actually, many were cleaned out entirely considerably ahead of new model dates.

Much of the inventory now in stock represents 1957 models awaiting introduction dates. Factories are expected to gear production closely to demand for the rest of the year with some extra inventory building for an expected upswing in sales next spring.

### **Safety Car Design Viewed With Caution by Industry**

Automobile manufacturers have been noncommittal about the so-called "safety" automobile developed by Cornell Aeronautical Laboratory and a large insurance company (see AI, Oct. 1, p. 39). Privately, they point out that there would be several

serious production problems with such a car. In addition, they feel that the public might well have some adverse reaction to some of the revolutionary features, such as substitution of steering levers for the wheel and backward seating.



Initial operation on the cowl line is the hand feeding of sheets onto the automatic press loading mechanism. Note that when the sheet is carried forward into the loader, it conforms to the contour of the roller conveyor and is sprayed, top and bottom, with a water soluble lubricant.

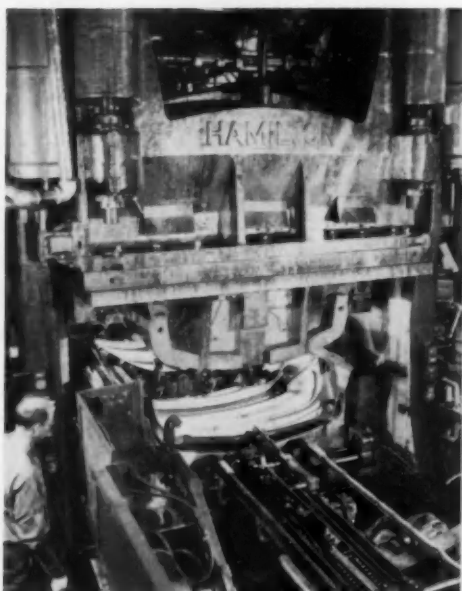
**W**ITH an extremely flexible mechanized stamping line, The Budd Co. produces cowl tops at an economical rate of production for Ford commercial truck cabs. Six presses, ranging in capacity from 400 to 800 tons, interspersed with the necessary mechanization devices, make up the production line. The entire setup has been engineered on a flexible basis so that other work can be interchanged with the truck cowl running the line at intermittent intervals.

Sheet steel manually loaded into the first mechanized device is carried forward by two chain actuated fingers. At this point, the sheet is automatically bellied by its own weight to conform to the contour of the mechanized roller conveyor. It is then sprayed, top and bottom, with a water soluble lubricant. Next, the sheet is mechanically inserted into a Hamilton 800-ton ca-

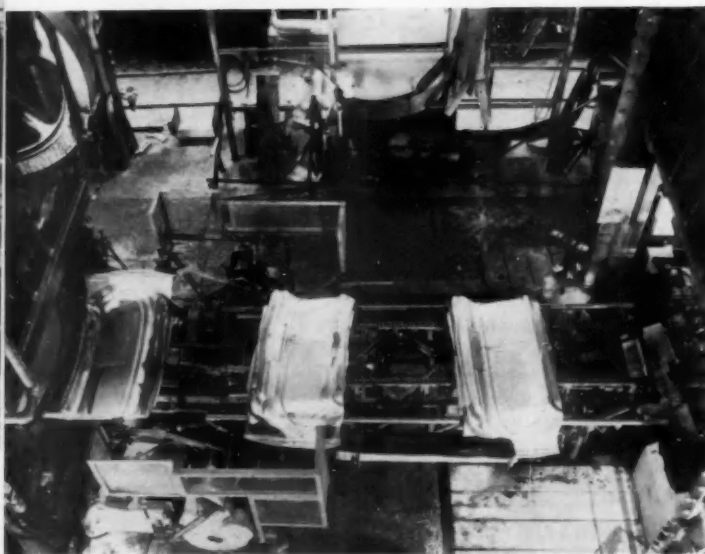
By Thomas Mac New

## MECHANIZED STAMPING LINE

### for Truck Cab Cowl Tops



At the rear of the first press a center arm extractor lifts the work out of the die cavity onto a turnover mechanism. Arms on each side of the center extractor air clamp the part and turn it over onto a chain conveyor.



capacity, double-acting press for the initial drawing operation. At the rear of the press there is an automatic extractor and turnover device. An air cylinder operates the center arm extractor jaws which clamp the workpiece. The entire air cylinder and center arm extractor device then moves rearward so that the stamped part is lifted and pulled clear of the die cavity and hence engaged by two arms—one on each side of the mechanized conveyor. As the workpiece is clamped in the arms and released by the center extractor, the arms move in an overhead semi-circular motion, thereby turning the workpiece right-side up. The jaws are air operated, and Warner electro-magnetic clutches are used to engage the drive for the turnover operation. In order to carry the turnover operation out as smoothly as possible, the crank controlling the movement of the arms has been equipped with a spring counterbalance. This entire setup of extractor and turnover is one of the most striking examples of Budd-applied mechanization on the cowl line.

Cowls are then carried by means of chain conveyor to a 600 ton Clearing press. This press is equipped with scrap chutes for small stock trimmed from the outside of the cowl and windshield, while the large pieces, which are blanked from the inside of the windshield framing, are directed to a side conveyor where they are carried away for small parts stampings.

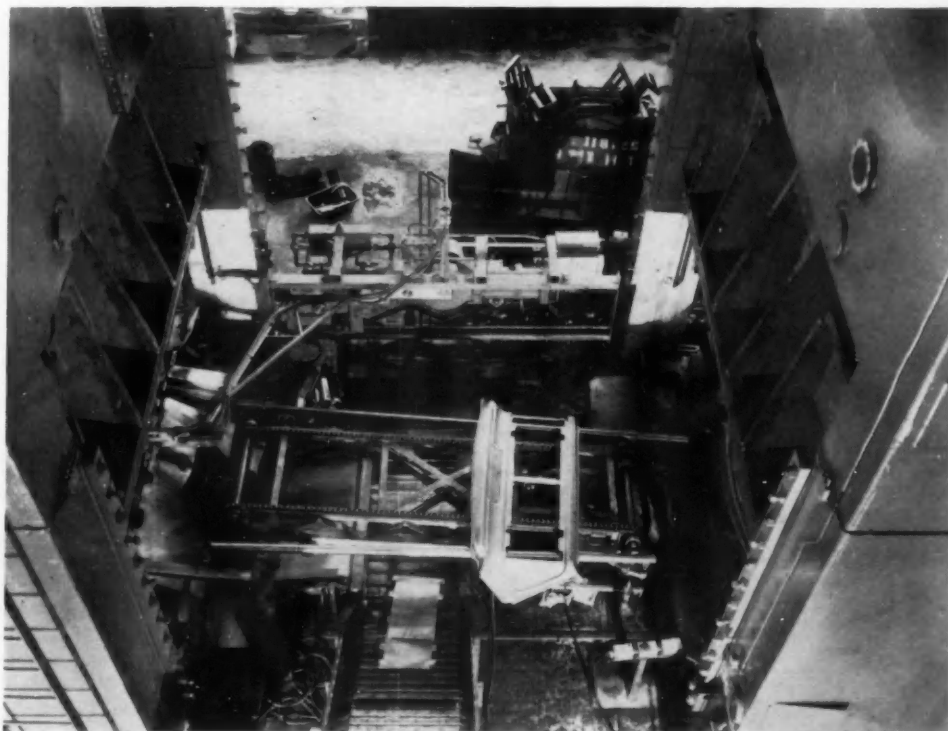
At the rear of the second press a universal side arm

extractor is utilized. As the workpiece is brought out of the die, it is deposited on rails and moved by chain conveyor to the third operation. Here, the windshield cowl is again manually fed into another 600 ton Clearing press which is used to restrike the part and final trim the cowl vent. The die in this press is equipped with a kick-out device operated by an air cylinder.

The mechanical device for unloading the work from the third press consists of two trunnion-mounted cylinders with a cross plate holding them parallel. An air cylinder is attached to this cross plate. Pistons secured by another cross plate, which in turn is secured to the air cylinder shaft, are fitted into the trunnion-mounted cylinders. As the limit switch is tripped on the upward movement of the press, the air cylinder is actuated, thereby moving the piston section with attached fingers under the top windshield crossmember. This small mechanized device is then moved rearward by another air cylinder, thereby lifting the workpiece out of the die and onto skid rails. At this point, another switch is tripped, and the device is retracted while the workpiece slides down the skid rails to be engaged by a chain conveyor.

For the fourth operation, which is a restrike, the work is manually fed into a Clearing 600-ton press. Another side arm extractor of the universal type is used at the rear of the press to remove the workpiece and to deposit it on another chain conveyor. The fifth operation, used for restriking and final flanging the

The third mechanized device located between the second and third presses is a Budd universal side arm extractor.



post lines, utilizes the same equipment as operation No. 4. For the sixth and final phase, a Clearing 400-ton press is used, also manually fed and equipped with a side arm extractor. In this case, however, the extractor takes the work to a belt conveyor which in turn carries it to a loading station where the part is placed on the main mono-rail. The sixth operation is used for the final trim of the post and windshield.

For the most part, the presses and mechanized equipment are equipped with Stewart-Warner central lubricating systems. Air cylinders are used throughout all the mechanized devices. Each cylinder is equipped with oversize shafts. The chain conveyors are of standard type and were designed and built by Budd. Link Belt chain is used.

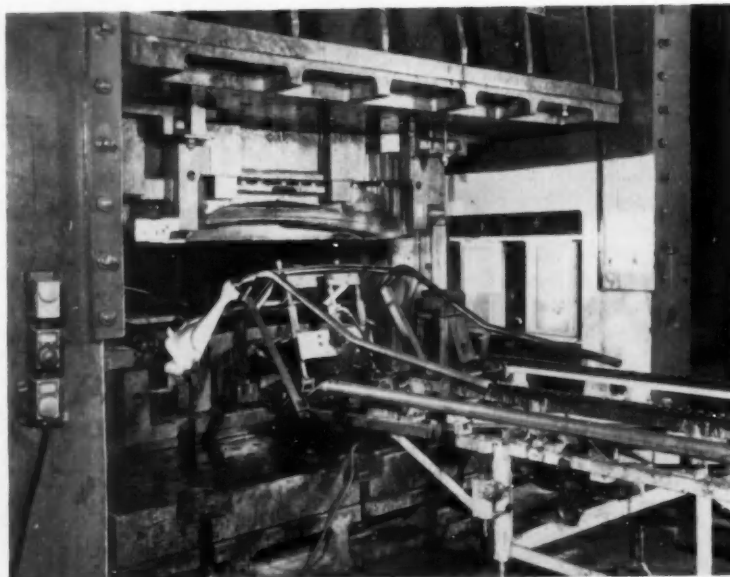
In each operation scrap is either dropped through the dies then through the floor to a heavy duty under-press scrap conveyor, or by chutes off to the side and emptied into steel scrap carts.

• • •

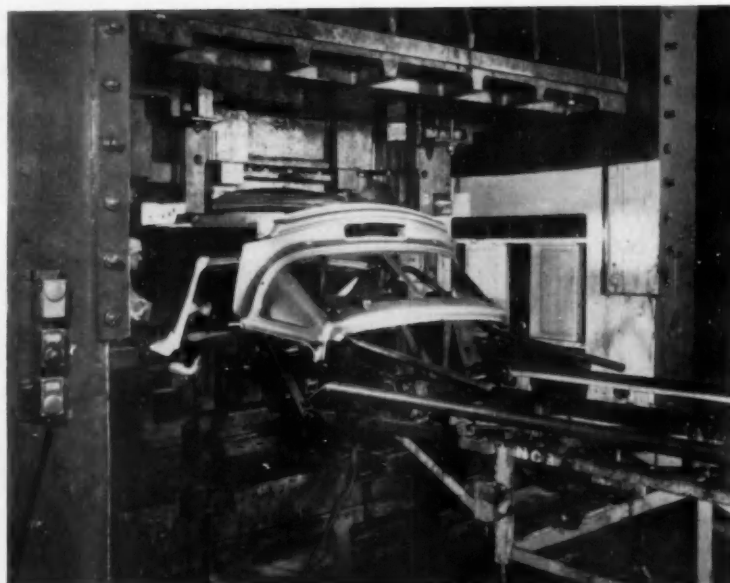
### **Chrysler Evaluates 9000 Aides To Locate Potential Abilities**

Each year hundreds of companies hire the services of management consulting firms to appraise their employees and find their potential abilities. Personnel from supervisory categories up to the president of the company undergo various tests and interviews by psychologists. The latter recommend steps that the individual should take to improve his performance and equip himself for possible advancement with his organization.

Some companies have their own management development programs with full-time coordinators working with all levels of management. Chrysler Corp. is among the companies which have instituted such a program. While the results of the Chrysler program have not yet been fully measured, the corporation reports that more than 9000 of its 11,000 management and supervisory employees have been "evaluated" since the program was started about 1½ years ago.



*The mechanized device for unloading the third press is located between the side rails and consists of a trunnion mounted air cylinder.*



The Chrysler program is tied in with various corporation training agencies, including the Chrysler Institute of Engineering, the Department of Industrial Education, and the Chrysler Conference of Sales Training.

### **Mack Trucks Awarded Order For Buses From Greyhound**

Greyhound Corp. has ordered 34 new buses from Mack Trucks, Inc. at

a cost of about \$782,000. Greyhound for the past several years has purchased practically all of its requirements from General Motors Corp.

Mack says it soon will file its previously announced multi-million dollar suit against General Motors charging mechanical failures on 570 Scenicrui-  
cruiser buses. Greyhound also has been named a defendant, but not a co-conspirator, in a complaint filed by the Justice Dept. charging GM with monopolizing the bus business.

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### Benefits To You

CASE-HARDENED Piston Rods (52-54 Rockwell "C") provide practically complete protection against damage from hammer blows, wrench-dropping, mishandling, and similar occurrences. Available from Miller at no extra cost.

The HARD CHROME PLATING over the case-hardened rods protects against scratch-damage and rust. Available from Miller at no extra cost.

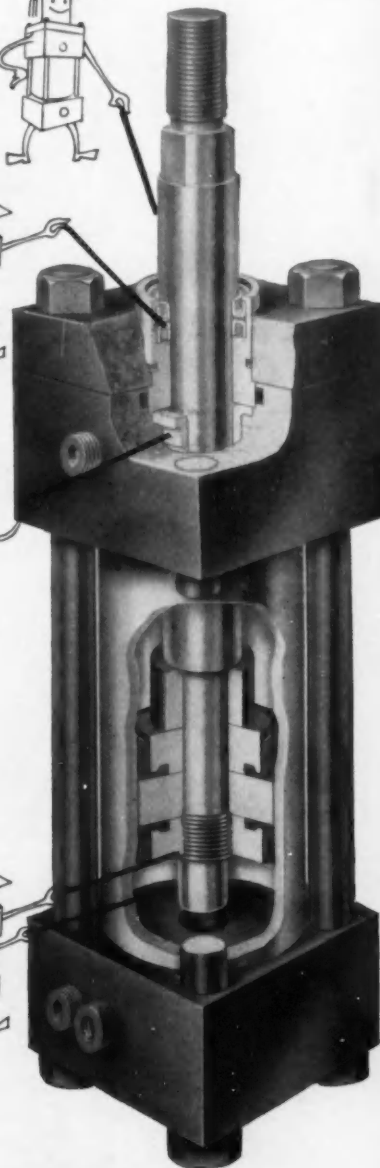
### Benefits To You

"TEFLON" Rod Wipers and "TEFLON" Hydraulic Piston Rod Seals withstand temperatures from -100°F. to plus 500°F. They are impervious to practically all known chemicals, including the fire-resistant, special, and standard hydraulic fluids in current use. Available from Miller at no extra cost.

### Benefits To You

Highest quality Black Ferric Oxide Finish provides rust protection in air cylinder operation and on all cylinders during shipping and installation.

Cylinder heads, caps, mountings, pistons, followers, tie rods, and the unplated portions of the piston rods have this finish at no extra cost on all Miller cylinders. (This finish not recommended for water service)



**NOTE.** On all Miller Hydraulic Piston Seals: Leather Cup Seals are standard, Piston Ring Seals are optional at no extra cost, and "Teflon" Cup Seals are available at extra cost.

Member of the National Fluid Power Association

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FLICK-REEDY CORP.

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COUNTERBALANCE CYLINDERS

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To (Dept.) \_\_\_\_\_  
"On all our future cylinder requirements, please specify the above quality features."

Signed \_\_\_\_\_

Title \_\_\_\_\_

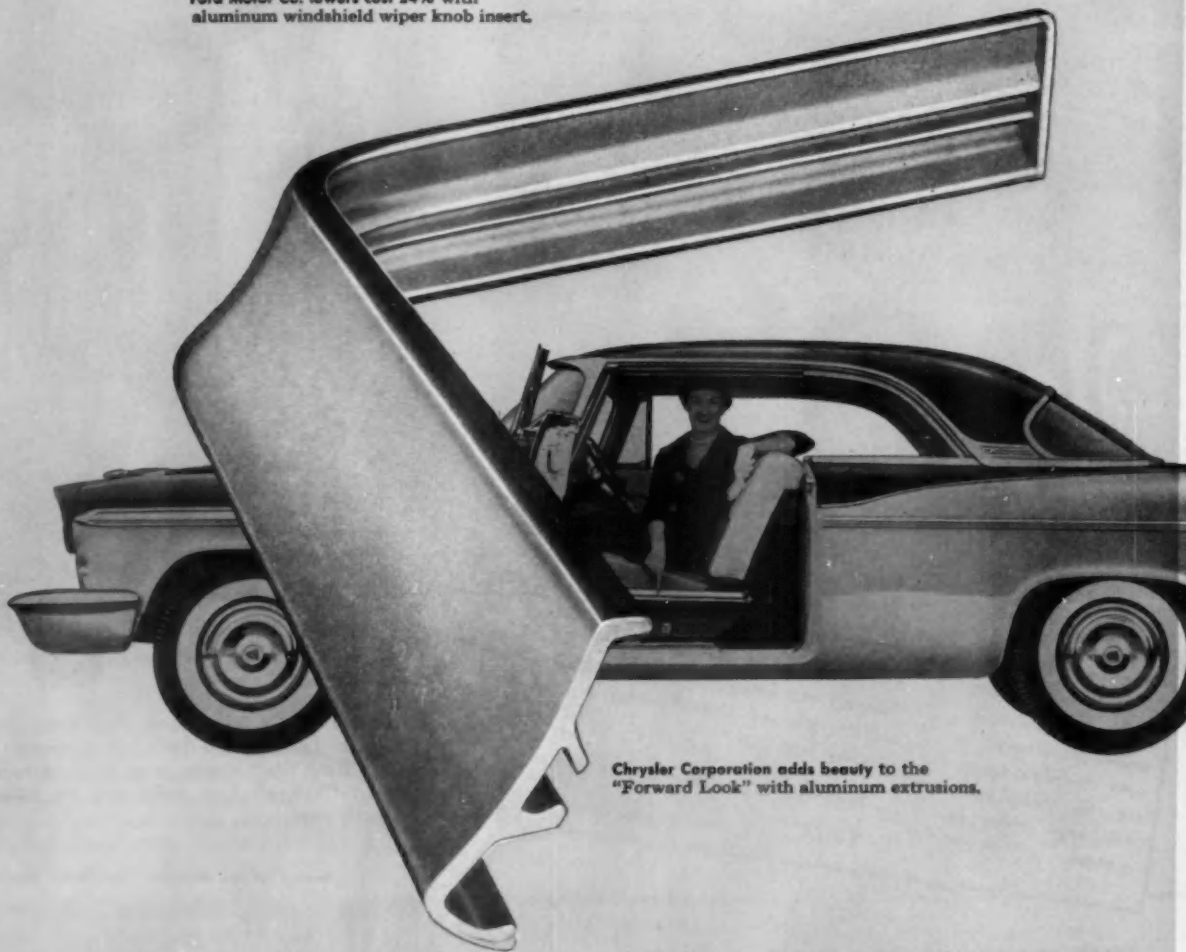
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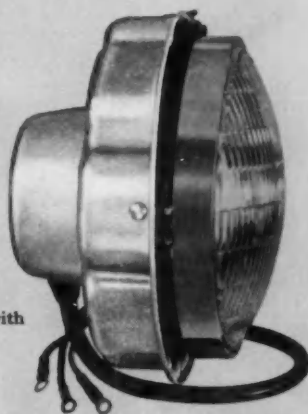
Ford Motor Co. lowers cost 24% with aluminum windshield wiper knob insert.



Chrysler Corporation adds beauty to the "Forward Look" with aluminum extrusions.



American Motors Corporation lowers cost 14% with lightweight aluminum battery cable.



Hall Lamp Co. improves quality with rustproof headlamp bodies.

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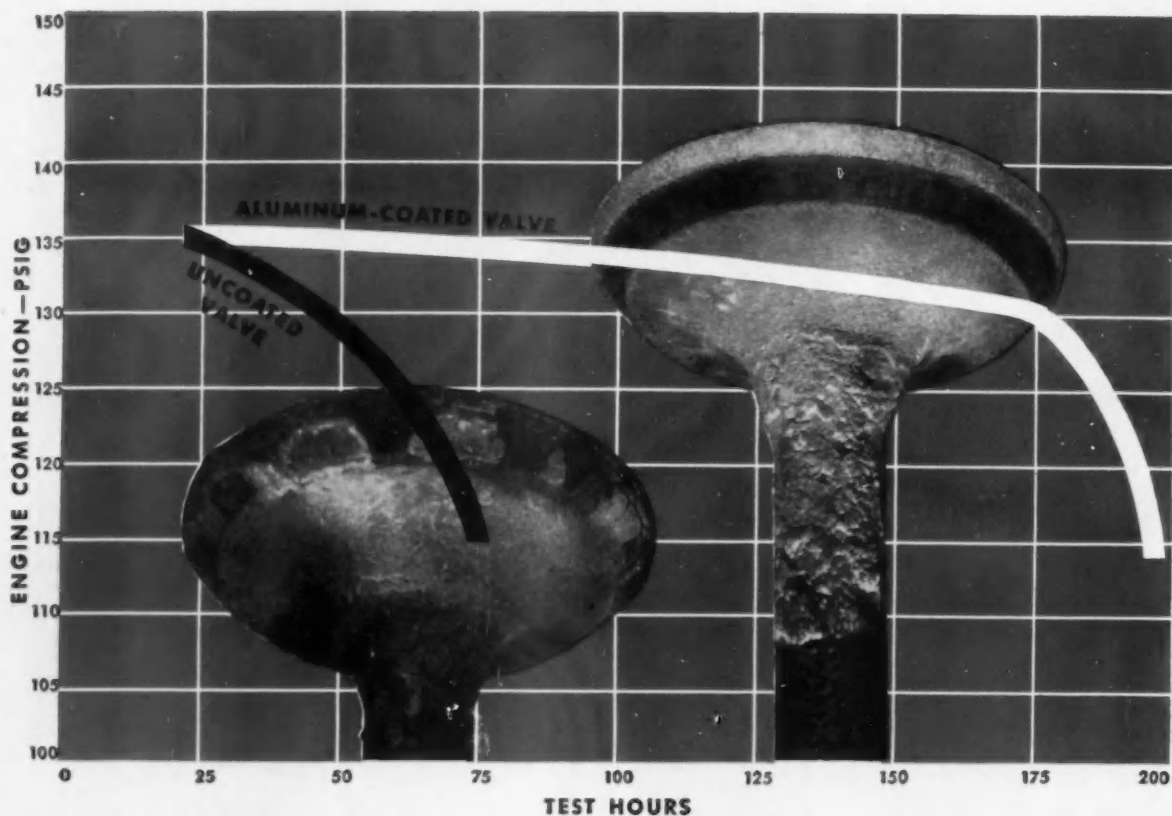
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Here's a long-lasting remedy for reduced valve life caused by corrosion...the Thompson method of coating exhaust and intake valves with aluminum.

Tests show that Thompson aluminum-coated valves last up to 186% longer than uncoated valves under identical conditions.

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minum to the valve assures penetration of the steel by the corrosion-resistant aluminum. This provides protection of the valve face from erosion by hot gases and corrosive agents from combustion.

Thompson sales engineers are prepared to discuss aluminum coating of exhaust and intake valves for your engines. Write today for information and engineering data.



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# SELF-LOCKING "PLACE" BOLTS

## ... cut costs ... add strength

... wherever involuntary loosening or fatigue is a problem!

In some typical automotive and farm equipment applications, for instance, "Place" Bolts are being used as connecting rod bolts, main bearing cap screws, and flywheel bolts.

Here, and wherever a locking bolt may be needed, the Slotted-Type "Place" Bolt offers not only positive locking action but economy and additional strength. It cuts costs because no additional parts or operations are needed. It adds strength because its controlled spring action guards against impact, shock and fatigue failures.

National makes the Slotted-Type "Place" Bolt in carbon or alloy steel, in any of a wide range of sizes. Write us for additional information, including our illustrated folder.



HERE'S HOW  
SLOTTED-TYPE HEAD LOCKS

The flexible diaphragm formed between slotted segments in the upper face of bolt head and circular recess adjacent to the shank in lower face (section X) acts as controlled spring element when head is properly wrenched against a rigid seat. Diaphragm is reinforced by the continuous-grained segment cold formed between upset slots in upper face.

U. S. Patent No. 2543705



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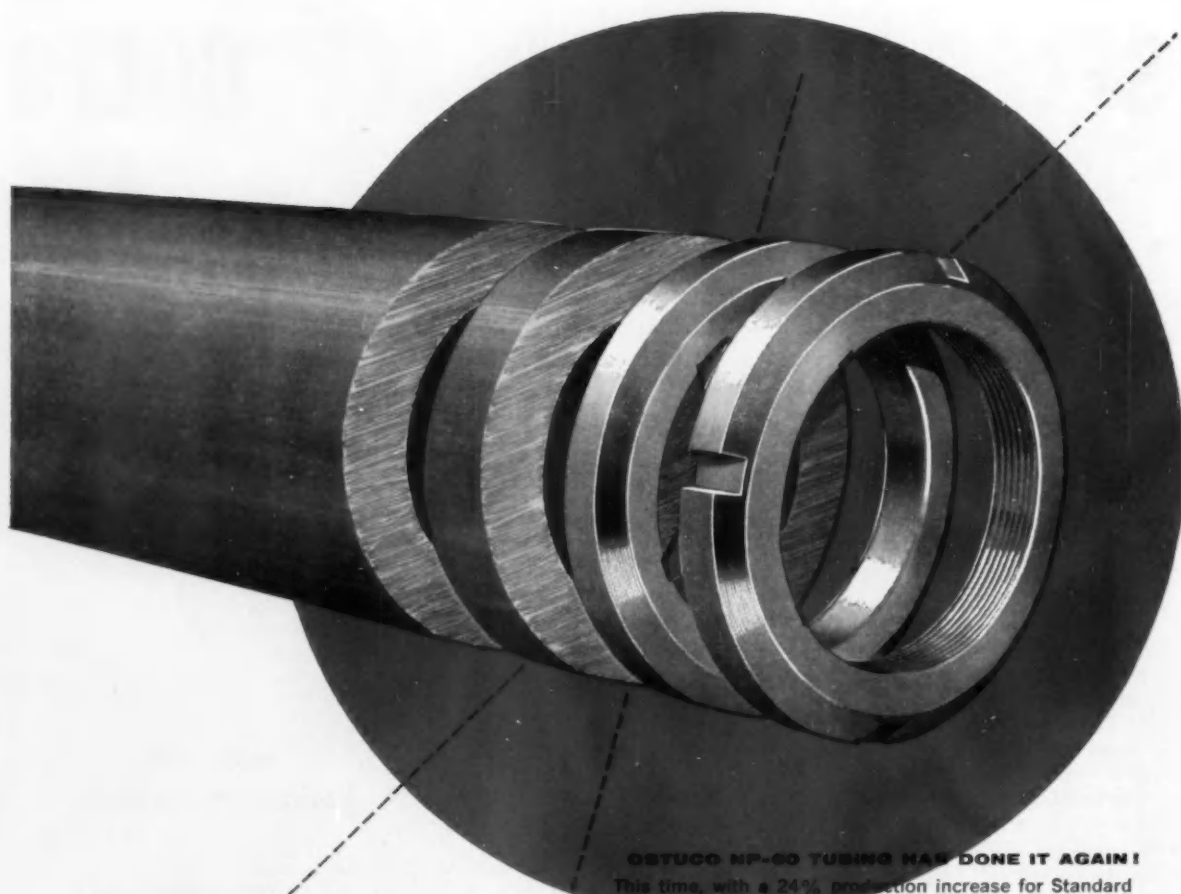


Model Chains



Chester Holsts





**24%** Production increase at  
**Standard Locknut & Lockwasher, Inc.**  
 after switching to **OSTUCO**  
**NP-60 tubing**

**OSTUCO NP-60 TUBING HAS DONE IT AGAIN!**

This time, with a 24% production increase for Standard Locknut and Lockwasher, Inc., Indianapolis, Indiana. Tubing experts from OSTUCO recently recommended a switch to NP-60 Tubing specially processed for machineability for Standard's locknut and lockwasher line used in ball and roller bearing applications.

Standard components find their way into electric motors, machine tools, automotive, aircraft, farm and construction equipment. Other companies, with equally diverse applications, report similar success with NP-60. If you are machining bearings, washers, collars, or any circular part, you'll do well to check into the merits of OSTUCO's new NP-60 seamless steel tubing.

**GET NP-60 WITH "SINGLE-SOURCE SERVICE."**

New NP-60 seamless tubing comes to you with OSTUCO'S unique "Single-Source Service"—experience and facilities for design and development, production and delivery all under one roof. Get together with a tubing expert for preliminary planning on NP-60's possibilities in your product. Contact your nearest sales office or write direct to the factory.



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# News of the MACHINERY INDUSTRIES

By Thomas Mac New

Machine Tool Sales Expected to Hit Around \$900 Million Mark at Year End. New Heads for Pratt & Whitney and Metalworking Equipment Div. of BDSA

## Tool-Buying Splurge

Tool buying in August showed a healthy 41 per cent increase over July. Dollarwise, sales ran over the 87 million mark, giving a total eight months' figure 33 per cent higher than the corresponding period of '55. Many executives in the industry believed that recent price boosts caused the sudden August surge of new business to beat the deadline. Sales for the year are expected to run close to \$900 million.

## Millions for Tool Replacement

New rules by the Defense Department have been issued to guide its purchasing officers in the procurement and replacement of machine tools. The Department emphasizes that it wants to see "active replacement program" in operation with respect to keeping up to date its vast holdings of machine tools.

Starting with purchases authorized for the 12-month period starting next July 1, the Defense Department says it will allow a total annual budget request approximating two to five per cent of the total acquisition cost of the machine tools in its inventory. The Government owns about \$3 billion in tools.

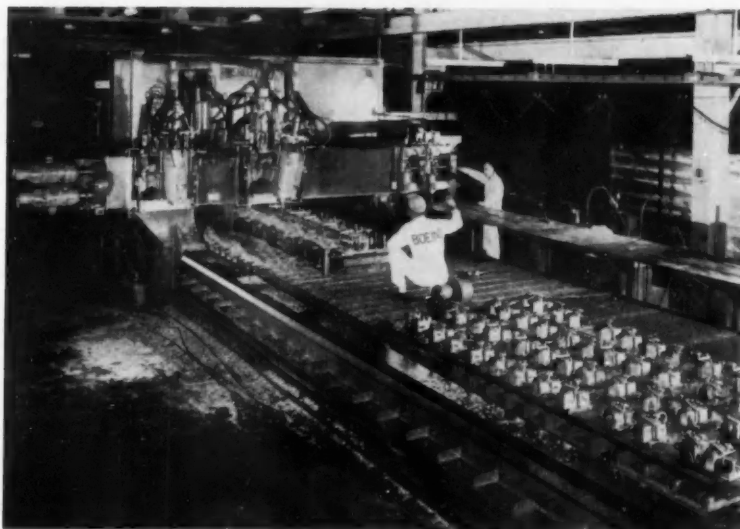
These funds are to be used for replacement of tools actually in use, and are not to be used for replacement of tools in reserve or in inactive plants.

## Gillane to Head P & W

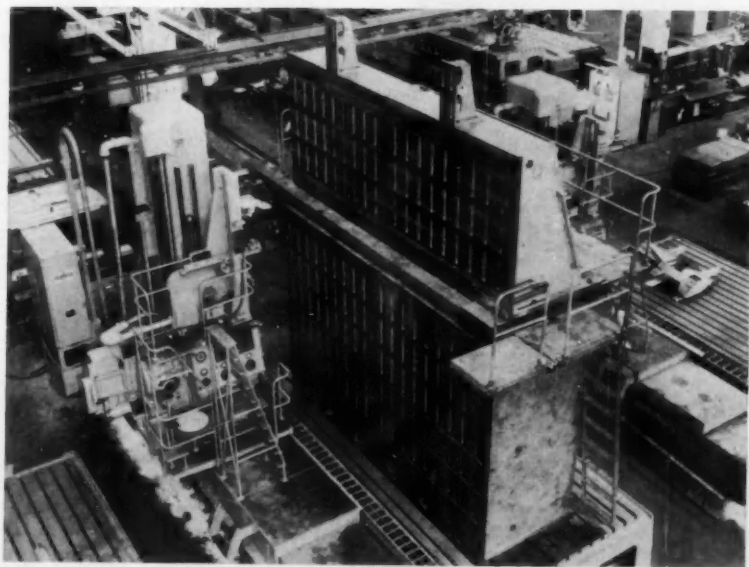
Alexander H. d'Arcambal will retire as president and general manager of the Pratt & Whitney Co., Inc., on November 1. He will remain active in company affairs in a consulting capacity and as honorary chairman of its board of directors.

At the same time L. D. Silberstein, chairman of the board, announced that Edward P. Gillane, executive vice president and a director of the company, will succeed Mr. d'Arcambal as president.

(Turn to page 176, please)



Boeing Airplane Co., Wichita, is using two Onsrud 85-ton contour profile milling machines equipped with General Electric tracer control systems. These machines are part of the B52 bomber program for the Air Force. The GE tracer control includes six one-dimension tracers capable of controlling three motions on each of two heads simultaneously. Either lineal cams or templates may be used.



Pratt & Whitney has shipped this huge Keller automatic tracer controlled milling machine to the Douglas Aircraft Co. in Santa Monica, Calif. The 73-ton tool will be used to mill forgings for advanced military aircraft. This type BG 22 Keller has a horizontal travel of 14 ft and a vertical travel of seven feet.

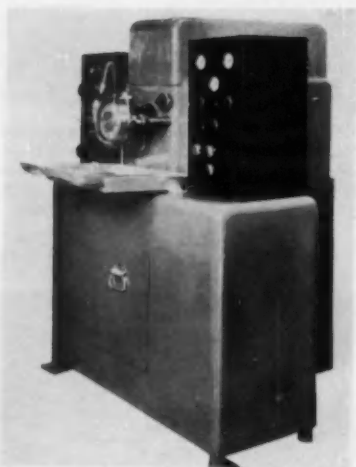
**NEW****PRODUCTION  
and PLANT****EQUIPMENT**

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

### Honing Machine

FEATURING feed and speed control from 100 to 1600 rpm using limit switches and variable speed motors, a new honing machine is said to offer instantaneous availability of ideal cutting speeds in the honing of precision parts. Limit switches control both the honing of the part and the usage of the honing stone. The same stone can be used to hog out stock and obtain a fine micro finish. Automatic loading of workpiece is another feature.

Cutting speeds start with a low rpm for roughing, and when the part



National Model S-6 horizontal type honing machine with automatic stroking and sizing

is within a predetermined size a very high rpm automatically takes over for final finish. Automatic sizing not only ends the honing cycle when desired size is reached, but also permits the operator to visually explore the bore during honing. Stone pressure control is also automatic for assuring the correct cutting pressure as determined by stone characteristics and part requirements. Stone pressure is constant yet infinitely variable, and dangerous overloading is said to be prevented by the pneumatic circuit. Stone feed-up is automatic and integral with the stone pressure control,

avoiding repeated stone adjustments to compensate for stone wear. Automatic segregation of parts according to various sizes is stated to be not ordinarily required due to the size repeatability obtained with the automatic sizing; but if several sizes are desired, automatic air-gage sorting is available. *National Pioneer, Inc.*

Circle 30 on postcard for more data

### Scale Remover

THE availability of a new product, designated Alka-Deox 109, for the electrolytic removal of scale and oxides from iron and steel, has been announced. The product is said to remove scale quickly, and with no chemical attack on the iron or steel because of the alkaline nature of the compound. It is stated to be particularly adapted to plating lines and automatic equipment involving alkaline or alkali-cyanide plating solutions. In such installations, equip-

ment corrosion from acid fumes is completely eliminated. *Enthone, Inc.*

Circle 31 on postcard for more data

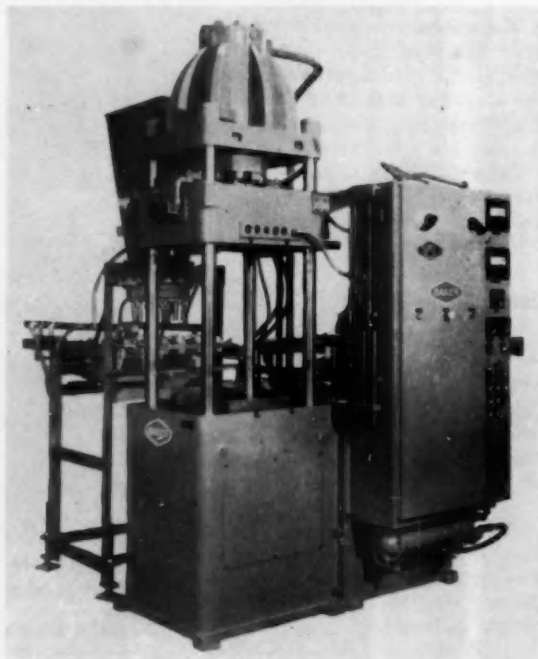
### Lubricant Tester

KNOWN as the Model LFW-1, a new lubricant, friction, wear-testing machine has been developed primarily for testing bonded coatings, a lubricant technique which is finding use in industrial applications. It can also be used for testing liquid lubricants.

A relatively small table model, it is said to be the first of its type which not only maintains a high loading accuracy, but also indicates friction forces throughout the test. Another feature is a pre-setting device which automatically shuts off the machine after it reaches a pre-determined coefficient of friction. *The Alpha Molykote Corp.*

Circle 32 on postcard for more data

### Plastic Compression Molding Machine



Fully automatic plastic compression molding machines are now available in this new 60-ton model which is said to allow selection of the shortest cycle for any particular molding job. Close, decelerate, breathe and open are quickly adjustable by setting timers and cams. Automatic loading is also adjustable for different molds. (*Baker Brothers, Inc.*)

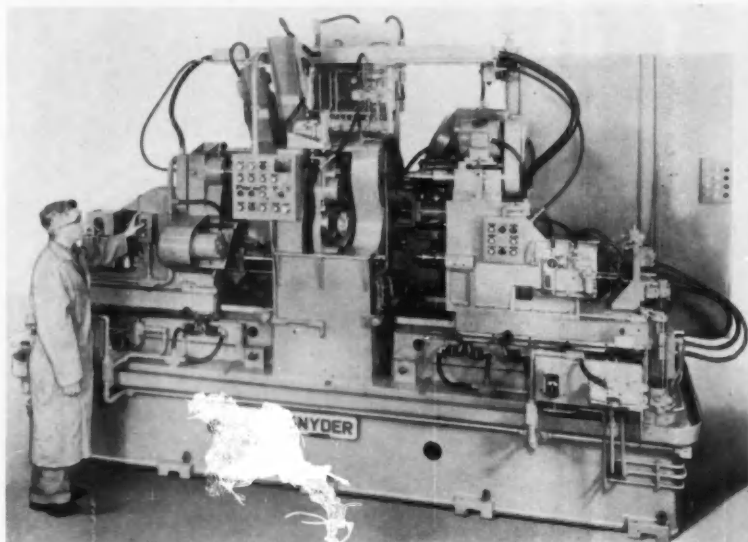
Circle 33 on postcard for more data

**NEW****PRODUCTION  
and PLANT EQUIPMENT**

## Boring Machine Performs Machining and Automatic Assembly Operations

A NEW six-station trunnion-type, two-way precision boring machine that performs both machining and automatic assembly operations has been designed and built. The machine, which has six precision boring spindles, utilizes a rotary hopper feed to direct split babbitt bushings to a plunger for press-fit assembly into the part. Deflection of the part during assembly operation is prevented by a hydraulic stop that advances to within 0.002-in. of the back face of the part. The unit illustrated machines 5-11/16-in. diam die-cast electric motor end shields and assembles a bushing in the center hole at a production rate of 350 pieces per hour at 75 per cent efficiency.

An end shield is manually loaded into one of the fixtures in the horizontal trunnion index fixture, chucked and a pushbutton operated to index the fixture and initiate the machining cycle. In the second station, boring spindles in each way unit advance to turn a groove on the outer Left Hand hub, rough face the Left Hand hub and rough bore, rough face and chamfer the Right Hand hub. At station three, a 3/4-in. hole is bored in the hub and chamfered, the OD is turned, and a step on the OD is faced with tools in a single boring head. The bushing is assembled in



*Snyder six-station, trunnion-type two-way precision boring machine performs both machining and automatic assembly operations*

station four. In station five, two boring spindles face both ends of the hub and bushing. The Left Hand side of the pressed-in bushing is chamfered in station six with a boring spindle.

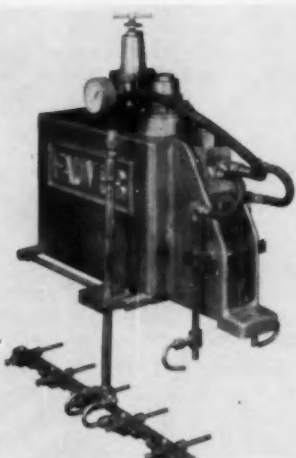
All machining operations occur simultaneously with parts in the five machining stations. At each index,

a part is unloaded from station one and another part loaded in and chucked before the cycle start button is pressed. The machining cycle on the hydraulically-operated, electrically-controlled machine is entirely automatic. *Snyder Tool & Engineering Co.*

Circle 34 on postcard for more data

## Conveyor Lubricator

IDENTIFIED as the 100 Series, a new conveyor lubricator is said to include four fundamental improvements. The mechanism is completely



*Fauver 100 series conveyor lubricator*

enclosed in an aluminum housing that provides for economy of space. Improved crown filters and regulators are now standard. A redesigned trip-mechanism actuates the hunt valve through a cam. Provision has been made for ease of installation and removal for service, and there is said to be no problem if the chain backs up.

The new series includes eight different models and consists of three types of oil lubricators: for trolleys and chains, for the bearings on slat-type conveyors, and for hot zone applications. *J. N. Fauver Co., Inc.*

Circle 35 on postcard for more data

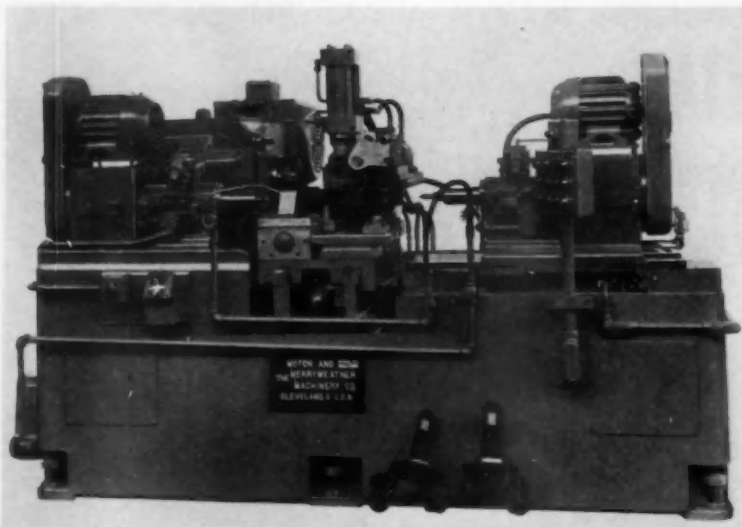
## Flaw Detector

DETECTION of small flaws close to the specimen surface by ultrasonic echosounding methods is now possible with a high resolving transducer recently announced. This transducer is reported to have the

ability to not only locate a flaw closer to the specimen surface than its quartz counterpart; but also to differentiate between two defects in the same minute area. When a 10 Mc/s, 3/4-in. diam transducer is used with a suitable instrument such as the Immerscope, it is said to be possible to detect a round plane flaw only 0.0017 sq in. area at a distance of 0.1 in. below the top surface of an aluminum specimen.

In addition to the line of standard high resolution transducers, the company also offers these new transducers modified to meet special requirements. These modifications include: special acoustic matching to the immersion fluid; beam focusing to any reasonable depth; and special shapes, such as a rectangular broad-beam "paint brush" style, for rapid automatic scanning of large surfaces. Broad-beam transducers up to six inches wide have already been delivered. *Curtiss-Wright Corp.*

Circle 36 on postcard for more data



Match & Merryweather universal milling and centering machine for truck steering knuckles

### Machine Mills and Center-Drills Steering Knuckles

RECENTLY designed and built, a universal milling and centering machine handles a complete range of sizes of truck steering knuckles. The shank end of the part is milled to length and centered, with the opposite end centered on the flange between the protruding bosses.

Manually loaded in a fixture on a movable table, the part is automatically equalized radially in self-centering jaws at the stem end. A hydraulically-actuated locating arm swings down between the bosses to move and locate the forging for length. The flange end is then secured by a top clamp and the end locator retracts. The fixture table traverses to the milling head fixed on the base at the

left of the table. The stem end is then milled and the table returns to the starting position. The center drill unit, fixed on the base at the left side, center drills by hydraulic quill feed. The same type of unit, on the right side, is mounted on a saddle to traverse to feed position between the protruding bosses. The cycle is automatic, including unclamping when completed.

The milling head is a single-speed, heavy-duty production unit. The drill units are a single speed, hydraulic quill feed type. Production averages 90 to 120 pieces per hour at 100 per cent efficiency. *Match & Merryweather Machinery Co.*

Circle 37 on postcard for more data

### Torque Wrench Tester

TORQUE wrench calibration has reportedly been simplified and made more accurate with a new type tester, just announced. In this tester torque is measured electrically by means of special SR-4 resistance wire strain gage type torque transducers. The first tester was recently designed and built for checking torque wrenches used on aircraft. Other devices can be calibrated with minor modification of the tester.

The torque measuring system consists of an electronic amplifier and an indicating instrument with rotating dial on which torque can be read in lb-in.: one lb-in. per division up to

2040 lb-in. and five lb-in. per division up to 6200 lb-in. The low range is provided in five steps of 440 divisions



Baldwin SR-4 torque wrench tester

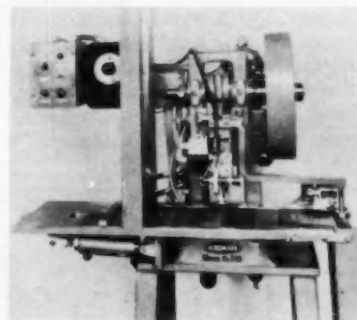
each and the high range in three steps of 440 divisions each. Separate torque pick-ups are used for the two ranges. Loads are applied on the handles of torque wrenches hydraulically through an adjustable fulcrum, and the tester is powered by plugging into a 115-v. 60-cycle line. Pick-up cells are provided with hex, square, and special adapters in sizes that will meet various requirements.

Operating controls include a loading knob, range selector switch, and load step switch to utilize the 440-division indicator scale on different sections of the full scales to 2040 and 6200 lb-in. The tester itself can be calibrated readily by means of a calibration arm and dead weights. It is 40 in. long 24 in. deep and 18 in. high overall. Total weight is 300 lb. *Baldwin-Lima-Hamilton Corp.*

Circle 38 on postcard for more data

### Hot Stamping Press

PHENOLIC plates with copper circuits are marked in color with circuit identification or assembly num-



Acromark 9AS hot stamping press

bers in a new adaptation of the Model No. 9AS Hot Stamping Press. It is provided with a preset counter for any desired number up to 1000. The machine counts, marks and ejects automatically the circuit plates. The ejector in turn places the marked plates in a magazine, in sequence.

Speed is 3600 marked plates per hour. Control is by means of a hand latch for continuous or intermittent operation at the will of the operator. In the actual operation, the number of plates to be marked are placed in the feed magazine, the counter is set for that number, then the hand latch release is pressed. The machine hot stamps in color any desired lettering and consecutive number. *The Acromark Co.*

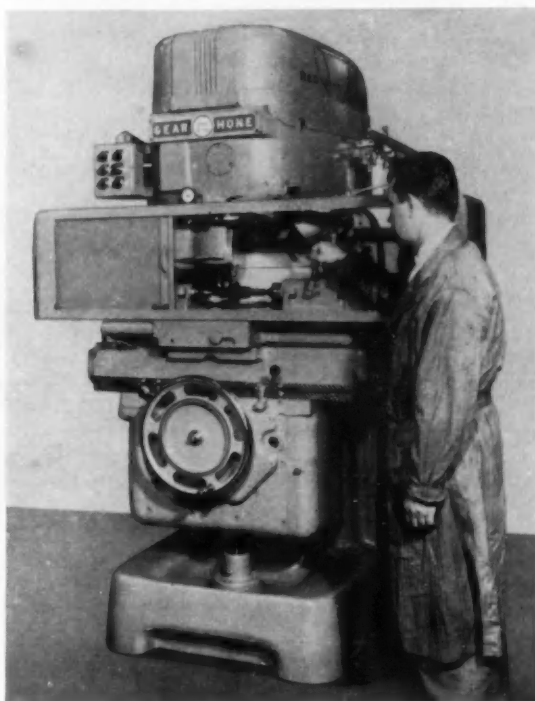
Circle 39 on postcard for more data

## Gear Tooth Honing Process Improves Sound Quality of Hardened Gears

**C**ALLED gear honing, a new basic gear production process improves sound qualities of hardened spur or helical gear teeth by removing nicks and burrs; correcting small heat-treatment errors in spacing, profile lead or eccentricity; and improving surface finish. To carry out the tooth honing process, company engineers have developed two initial models of gear hone machine tools that operate in conjunction with a unique new gear tooth honing tool. This honing tool is essentially an abrasive-impregnated helical gear that is run in mesh with the hardened gear in crossed axes relationship, at high speed. The hardened work gear is driven by the honing tool and traversed back and forth across the honing tool in a path parallel to its axis during the honing operation. The work gear is run in both directions during the process. The process is adaptable to manual, semi- and fully-automatic loading arrangements. The honing tool is a throw-away type that is discarded at the end of its useful life.

Currently two models of Red Ring gear hones are available for production. The first is the Model GHA, which is equipped with an automatic loader and designed to improve sound characteristics of high-production gears by removing nicks and burrs, making minor tooth corrections and improving surface finish. Gears are honed under low-backlash operating conditions with optional brake loading. This fully automatic machine has a specially-designed, high-speed

*Model GHB Red Ring gear honing machine set up to hone an automatic transmission helical gear. It is shown arranged for manual loading, but is also adaptable to semi-automatic or fully-automatic loading arrangements. A feature of this model is the self-adjusting table arrangement. The headstock and air-powered tailstock are mounted on a tilting table that is attached to the reciprocating work table through a hinged mechanism at the rear. Thus, the head and tailstock can be lowered either manually or automatically for loading the gear into mesh with the honing tool. After loading, the table is tilted upward into zero backlash position and locked, where it remains throughout the gear tooth honing operation.*

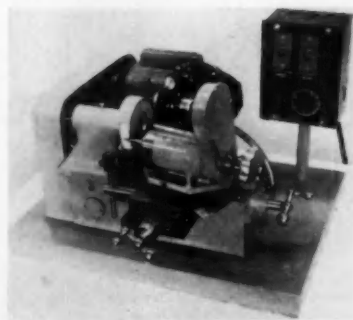


tool drive with head and tailstock spindles that can rotate up to 3000 rpm. Mist lubrication with controlled leakage provides a flushing action for continuous cleanliness of the precision spindle bearings.

The Model GHB universal gear hone is usable when more tooth correction is desired. This machine is adapted to manual, semi-automatic or fully-automatic loading arrangements. When arranged for manual

or semi-automatic loading, gears up to eight-inch pitch diameter can be honed. Gears up to three-inch pitch diameter can be honed when the machine is equipped for fully automatic loading. Crown honing operations can also be performed on the Model GHB when desired.

The action of the abrasive-impregnated honing tool removes nicks and burrs in the tooth flanks. The process is designed to remove metal up to 0.002 in. over pins. However, since the honing action tends to accurately generate a tooth form and shape, small corrections in tooth form and lead are made. Surface finishes of fine quality are stated to be readily achieved on shaved gears. A honing cycle of less than one minute will reportedly remove nicks, smooth the surface and make sufficient tooth form and lead correction to provide gears of uniform, low sound level. A lubricating-type coolant whose main requirement is the flushing of removed metal from the mesh, is used for providing maximum cleanliness. Small pinions are rotated at speeds up to 3000 rpm for the honing process. Larger gears are honed at speeds corresponding to about 800 sfpm. National Broach & Machine Co.



### Small Parts Grinder

*This Model WE precision grinder, now being offered, will grind pins or small parts up to a 90-deg included angle. (Dykrex-Roos Corp.)*

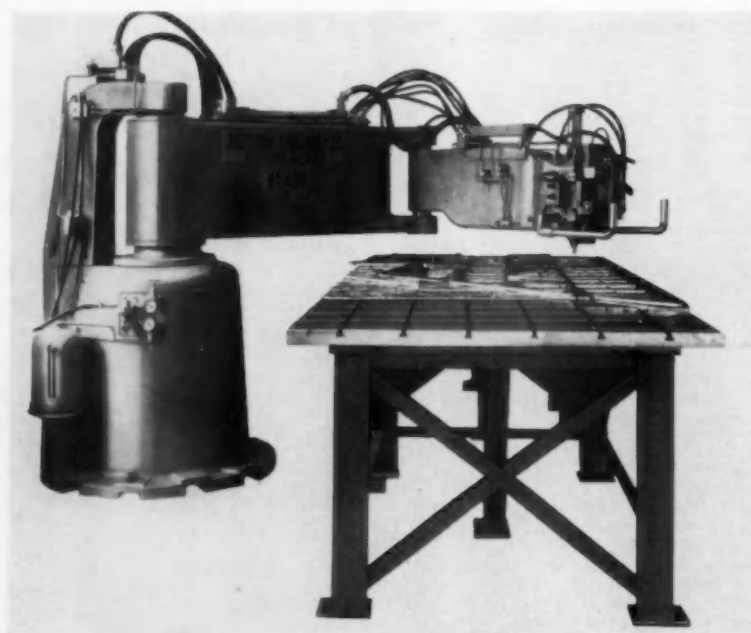
Circle 40 on postcard for more data

### Masking Tape

**C**OMMERCIAL availability of a new high-temperature crepe masking tape, identified as No. 102 Behr-cat, is announced. It is said the quick stick, adhesion and easy unwind properties of this pressure-sensitive tape recommend it for general purpose use in a variety of masking operations, with the added feature that it will resist temperatures of at least 275 F for one hour. Tensile strength of the tape is 20 lb per in. of width; elongation is 13.5 per cent. Of 9-mil gage, it has an adhesion to stainless steel of 33 oz per in. of width. It is made in a range of widths from 1/4-in. upward. Behr-Manning Co.

Circle 41 on postcard for more data

Circle 42 on postcard for more data



Ekstrom-Carlson No. 480 radial arm depth and contour mill

### Radial-Arm Machines Shape Aircraft Parts

**T**wo new radial arm depth and contour mills are said to meet the requirements of a high-speed spindle and a cutter capable of routing difficult contours and milling various shapes to different depths in producing parts such as wing panels, slugs, doors, frames, ribs, spars, stiffeners and other airframe members made by cutting away large portions of an aluminum plate to leave the complex form desired. The basic machine consists of a heavy column-like base carrying jointed, radial arm. At the end of arm is mounted a high-cycle high-speed direct-drive cutter motor which is available with adjustable speeds as high as 14,000 to as low as 3600 rpm. A T-slotted table under the arm holds the aluminum slab to be machined.

These machines come in two sizes, the difference being principally in the length of the radial arm. The No. 480 is the larger of the two, with a maximum arm extension of 120 in. from column center to spindle center. It has a 60 by 120 in. work table. The No. 484 is smaller, with a maximum arm reach of 60 in., and a 30 by 60 in. work table. The arms are so pivoted that they have an extensive swing at each joint, so that the cutter can be moved all over the work table area and some distance beyond.

An optional accessory with either machine is a canopy structure to

which can be mounted an overhead template. To use such a template, an overhead follower is attached to the upper part of the outer arm so that it lines up directly with the cutter spindle. This follower is retractable and adjustable by a remote control hydraulic mechanism. Follower inserts can be selected to match cutter sizes.

The cutter motor is slide-mounted and independently adjustable for depth of cut by a separate hydraulic cylinder. Other features include mist lubrication to motor bearings, double slides, four-position depth stops with micrometer adjustments, and chuck nut or drawbar typecollets. The manufacturer guarantees depth cutting performance to 0.005 in. *Ekstrom, Carlson & Co.*

Circle 43 on postcard for more data

### Corrosion Preventive

**T**HE development of a water-based, non-flammable corrosion preventive for the protection of metal surfaces has been announced. The new product, No-Ox-Id Safeguard, is a water emulsion of waxes and oils in combination with selected corrosion inhibitors. When applied cold by dip or spray, it is said to form a transparent, highly-protective, wax-type film. No noxious or explosive fumes

are emitted. After a brief drying and curing period, the coating cannot revert to an emulsion, nor will it wash off during outdoor exposure, according to the report. It is also said to resist fingerprint corrosion, whether the part is subjected to handling before or after application. *Dearborn Chemical Co.*

Circle 44 on postcard for more data

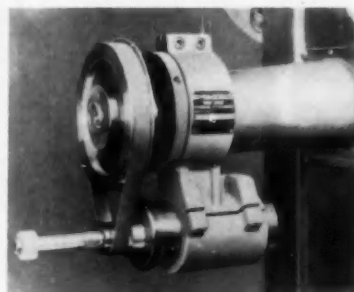
### Arc Weld Anti-Spatter

**A** SILICONE-CONTAINING emulsion which is said to eliminate chipping, grinding and other post-weld cleanup operations, has been introduced. Called X-7 anti-spatter, it is applied to the spatter area before arc welding and forms a thin protective coat over the weld metal. This invisible coat prevents molten spatter from sticking, and enables the operator to whisk away spatter with a cloth or spray after welding.

Anti-Spatter is non-toxic, odorless, and non-flammable. It can reportedly be used on any metal without affecting weld quality, and costs less than one cent per square foot of treated surface when used on normal arc welding operations. By using a cloth, brush, or fog spray, it can be applied any time up to weeks before welding. It will not "cake up" on the workpiece or fixtures, and in most cases no special post-treatment is said to be required where the weld surface is to be painted. *Linde Air Products Co.*

Circle 45 on postcard for more data

### Grinder Attachment



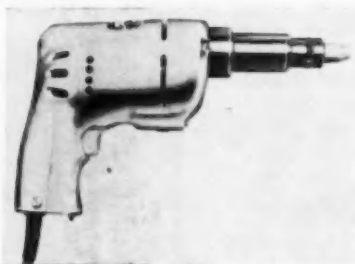
For use with surface grinders, this new high-speed attachment provides a higher spindle speed (14,000 rpm) and is designed for the grinding of angles or slots too small to permit the use of standard size grinding wheels, serrations, T-slots and other hard-to-get-at surfaces. It mounts on the surface grinder spindle; belt tension is adjusted through the use of an eccentric bushing. (*Boyar-Schultz Corp.*)

Circle 46 on postcard for more data

## Electric Screwdrivers

WITH the addition of No. 10 adjustable and positive clutch Scruguns, a portable electric screwdriver line has been made more complete than ever, according to recent announcement. Formerly, in the line that include drivers for screws from No. 8 through 18 sizes, the No. 10 size was available only with a center drive design best adapted for overhead suspension. The new No. 10 units are designed with pistol-grip trigger switch features that permit the operator to hold the tool comfortably like a gun, facilitating work on equipment requiring screwdriving in awkward positions.

The positive-clutch No. 10 unit contains a clutch designed to keep the screwdriving mechanism disengaged until the operator applies pressure. Thereafter the tool keeps driving until the operator releases his pressure. A feature of this mechanism is that it allows the operator to have control



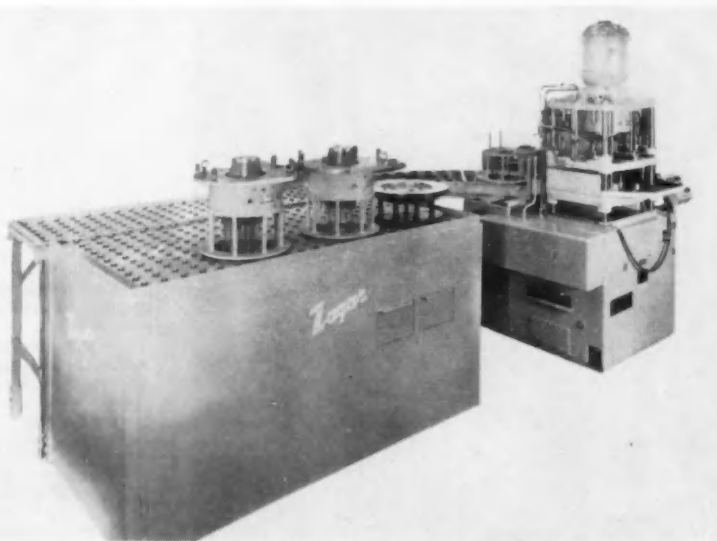
Black & Decker No. 10 Scrugun

of the torque when driving screws in material where differing grains and densities require varying degrees of power to be applied to each screwhead.

On the other hand, the adjustable-clutch No. 10 tool can be adjusted so that the clutch disengages after a certain pressure has been reached. This makes it possible to give a predetermined tightness to each screw or nut on an assembly operation, and is particularly adaptable to free-running machine screws in metal and other substances of constant density, where greater uniformity is desired in the finished work. When connected to the new power speed control unit, the adjustable clutch model can also be reduced in capacity to drive screws of much smaller size.

For work in inaccessible places, a special model of the No. 10 Scrugun is also available with a 90-deg angle head. *The Black & Decker Mfg. Co.*

Circle 47 on postcard for more data



## Quick Tool Change in Multiple Spindle Drilling

The setup illustrated shows how variable production needs may be handled when utilizing multiple spindle drilling. The small four-post unit houses 24-in hydraulic drill heads. Basic unit is designed for ease of changing heads and tooling. The head is changed by dropping it on a loading basket. Each head is carried on its own basket, which is rolled on a conveyor and onto the roller table. The roller table serves as storage for the heads. A number of heads is thus made quickly available for drilling various hole patterns. (*Zagar, Inc.*)

Circle 48 on postcard for more data

## Heavy-Duty Conveyor

FOR conveying heavy items such as spiral metal turnings, stampings, castings, forgings, etc., the new Pan-Link conveyor is said to be of unusually simple construction. No conventional chain is included in the design. Instead, flat side skirts serve as links and also as sides to contain the conveyed materials. Another feature is the mounting of wheels on an axle rod which passes through a set of double bushings. The smaller diameter inner bushings are welded to the rear edge of the leading apron pan, while the larger diameter outer bushings at both sides are welded to the leading edge of following pan. This patented construction is said to be especially advantageous when carrying abrasive materials because it eliminates the abrasion and rapid wearing out of one pan edge against another. Coolant fluids can also drain out between the pans.

The conveyor housing is a girder-like box section, with two pairs of longitudinal rails on which the loaded and return apron rolls. Rails also reinforce the housing, reducing the need for exterior support. Modular conveyor sections are built in standard 10 ft lengths for assembly to any

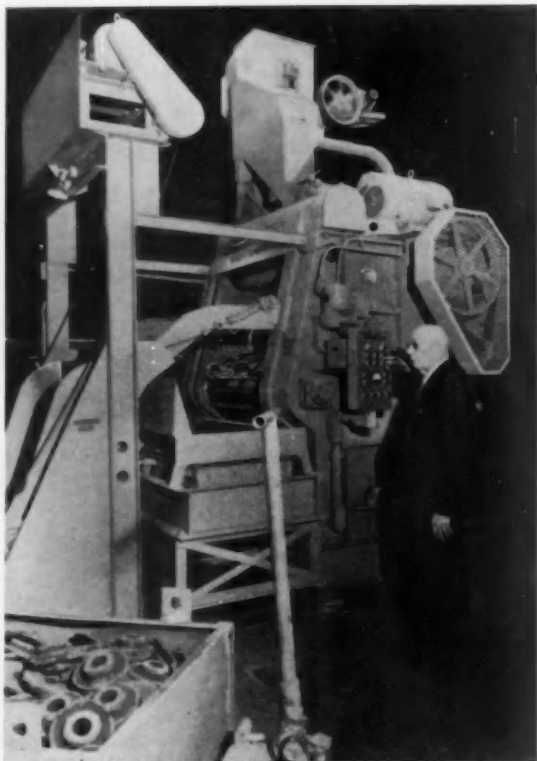
length required. Apron design is flexible, permitting conveyors with one drive unit to operate horizontally, with ascending or descending sections.

Carrying hot parts to and from heat-treating operations, or abrasive materials such as glass cullet are other Pan-Link applications. Sections are available in heavy-duty and extra heavy construction, with pan thicknesses from 12 gage to 1/2 in. and widths from 16 to 72 in. across. *Hapman Conveyors, Inc.*

Circle 49 on postcard for more data



Hapman Pan-Link conveyor



*Loading skip bridges unloading conveyor when raised to deliver rough castings to Blastmaster Barrel. Entire cleaning cycle is automatic, including material handling; but each phase may be controlled separately, if desired, by pushbuttons on control board*

### Automation Applied to Blast Cleaning

FOR cleaning and descaling parts in large volume, the fully-automatic Blastmaster Barrel is now being offered in which all operations including material handling, weighing, starting and stopping the rotation of the barrel are automatic. Several barrels can be grouped in a line receiving dirty castings from the shake-out by way of a conveyor feeding the loading skip at each machine. After the cleaning cycle, one common conveyor serving all the barrels in the group would take the clean, descaled parts to the next operation.

The detailed cycle of operation begins with the loading of the skip by the incoming conveyor. When a load of predetermined weight is in the skip, a switch automatically stops the feeding conveyor. When the blasting cycle in the barrel is completed and the load discharged, the skip is automatically raised which dumps the dirty castings into the barrel. The skip returns to the loading position and is immediately filled with another load of dirty castings. The door of the barrel shuts, the barrel begins to rotate, and the Rotoblast wheel begins to throw abrasive. After a predetermined period, the Rotoblast wheel stops and a short period of

tumbling takes place, to drain abrasive from work. The barrel stops, the door opens, barrel reverses direction, and the cleaned castings are dumped out of the barrel onto another conveyor which takes the castings to the next step in processing. The skip dumps in a new load and the cycle is repeated. All of the steps in the cycle are controlled automatically. However, the blasting cycle can easily be changed in a matter of seconds, to suit the cleaning time required.

The 12 cu ft Blastmaster Barrel illustrated is equipped with a Rotoblast wheel 19½ in diam with three inch throwing vanes. A 15-hp motor drives the wheel which can throw 24,000 lb per hr of shot. The barrel can be furnished in four sizes 6, 12, 18 and 27 cu ft. Pangborn Corp.

Circle 50 on postcard for more data

### Tachometer Generators

NEW a-c and d-c small-diameter tachometer generators, for industrial applications such as speed measuring and regulation, and designed for incorporation into variable speed drive systems, have been developed.

For speed indication on steel and

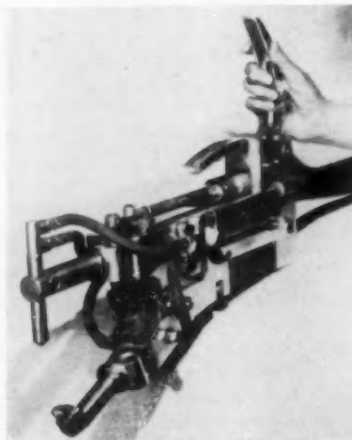
aluminum mill drives, all types of machine tools, and where speeding indication of moderate accuracy is required, the four-pole a-c tachometer serves a speed range of 400 to 5000 rpm. The unit has a voltage output of 28-v per 1000 rpm, plus or minus 10 per cent, according to company engineers.

The compact a-c generator, six inches long and weighing less than four pounds, is available in base or precision machined end flange mountings. Seamless steel shell-type construction is a feature of the model.

Low shaft inertia and 1.5 per cent ripple are two features of the d-c tachometer generator. Designed for high-accuracy speed indication and feed-back regulation, the unit is used with all types of machine tools, and steel and aluminum mill drives. These tachometers will supply enough power to operate one instrument and one recorder, engineers say. Models are available for both 50 and 100 volts per rpm. Constructed with steel brush cover plates, the tachometer has a length of 7.47 in. and weighs approximately 6.5 lb. When used with suitable instrumentation, the d-c unit will measure rotational speeds from 100 to 5000 rpm and linear speeds which can be measured in terms of rpm. General Electric Co.

Circle 51 on postcard for more data

### Spot Welder



Featuring a convenient lever that lowers and raises the bottom arm for speeding up production, this new Model 192 spot welder is said to also incorporate high welding current for its size, easy one-hand operation, and easily-adjustable spring pressure. (Aro Spot Welders Div., Guthrie Machine Tool Corp.)

Circle 52 on postcard for more data

## Two-Station Machines Deburr and Chamfer Both Sides of Gears Simultaneously

WITH new two-station Duplex Burr-Master machines, for the simultaneous deburring and chamfering of both sides of gears or splines, both stations can be used for deburring and chamfering of the same size and type of gear or spline, or different parts can be handled on each station, depending on production requirements. Output rate at each station is up to five teeth per second with spur gears, helical gears and straight sided or involute form splines all being handled readily on the machine. The Model BMED-24 Duplex has a work range from 0.625 in. to 6.5 in. pitch diam, with the Model BMED-29 handling work from 3.0 in. to 9.5 in. pitch diam.

Work cycle is automatic and electric clutch stops machine with cutters withdrawn for loading and unloading. Separate motors and controls are supplied for each work station, permitting flexibility in operation. Parts to be chamfered are placed on the work spindle, taking central location from either the hole or shaft diameter and vertical location from the edge of the gear or spline. Radial location and indexing of workpiece is taken from the gear teeth proper. To chamfer the gear or spline, two dovetail form cutters are stroked simultaneously past the edges of the teeth, one at the bottom and the other at the

*Model BMED-24 Duplex Burr-Master deburrs and chamfers top and bottom of gears or splines at the same time at rates up to five teeth per second. Both stations can be tooled to handle the same part, or a different part can be deburred and chamfered at each station. Larger gears are handled on the Model BMED-29 Duplex Burr-Master.*



top. Depth of chamfer is infinitely variable with the adjustment being made in the tool holders.

Fixtures for this machine are so designed that they can be replaced with other tooling when production must be shifted to a new gear or spline. Tooling developed on a mas-

ter machine in the company's plant is shipped to the customer's plant and can then be dropped into position. The complete changeover for either station can normally be completed in about 15 minutes. With this preset tooling there is said to be no need for trial cuts or gaging in setup. Resharpener tools is simple. Only the cutter locating face of the dovetail form tools have to be ground. Relief grinding is not necessary, making it possible to get up to several hundred grinds per tool. The cutter is then replaced in the holder by being brought up against a stop, insuring cutter alignment.

The machine is equipped with upper and lower cam-actuated rocker tool assemblies, precision ball bearing intermittent indexing assembly with provision for radial adjustment of pilot gear for radial tooth location, and ball bearing mounted vee belt drive totally enclosed with necessary safety guards. Model BMED-24 and 29 Duplex Burr-Masters are built to JIC electrical standards. Two one-horsepower, 1200 rpm, 220/440-v a-c motors are used, one for each station. Floor area required is 32 by 52-in. for the Model BMED-24 and 37 by 57-in. for the BMED-29. *Modern Industrial Engineering Co.*

Circle 54 on postcard for more data

### Sequence Time-Recorder

DEVELOPMENT of a new timing-recording instrument, called the Monitorecord, specifically designed for split-second monitoring of multi-operational automatic machinery, was recently announced. Up to 14 or more operating sequences can reportedly be simultaneously timed to within one hundredth of a second and recorded on a strip chart for ready visual reference, enabling personnel to keep tabs on production by spotting faulty cycles and adjusting sequences for most efficient operation.

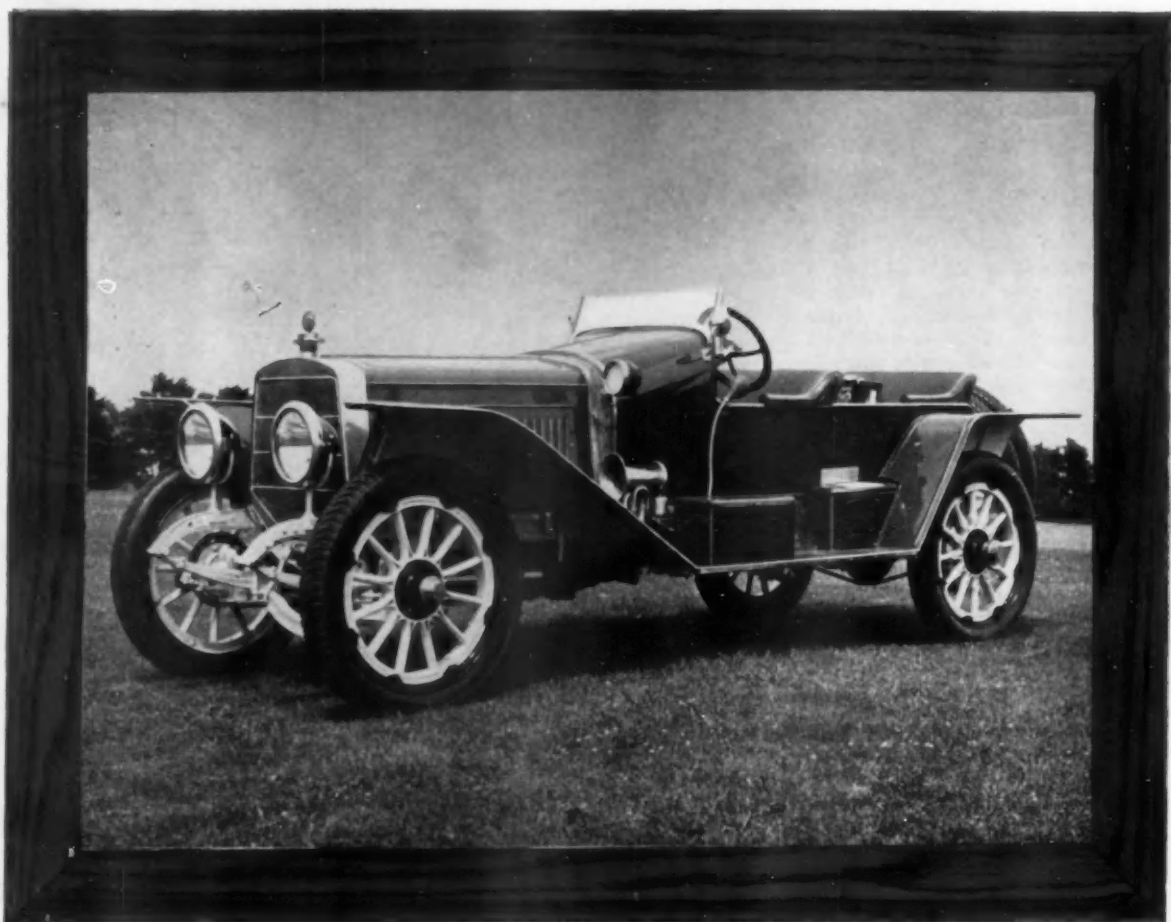
The portable instrument can be plugged into the electrical control circuit without shutting the machine down, and no other external power supply is required. The start, stop and duration times of the various sequences are timed and recorded on a five inch chart of pressure sensitive paper. A handy time scale of 0.2 sec-

onds to the inch is marked on both sides of the chart, and there is ample space between lines for making notations. *The Sheffield Corp.*

Circle 53 on postcard for more data



*Sheffield Monitorecord sequence time-recorder for automatic machine equipment*



*Send for free print—1913 Lozier. This print, from collection of P. S. DeBeaumont, not for commercial use.*

"Legitimately high-priced," the 1913 Lozier cost over \$5000. It featured a modified toy tonneau body, a T-head six-cylinder engine with 51 h.p. and a top speed of 81 m.p.h. Ignition was dual battery and magneto. From 1907 to 1911,

the Lozier maintained an enviable racing record. This is one of a series of antique automobile prints appearing in Morse advertisements. Write for your free copy, suitable for framing, to: Morse Chain Company, Ithaca, N.Y.

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## FREE LITERATURE

### Fluid Drives 1

Adjustable speed fluid drives for industrial applications, of the new 1 through 25 hp Type VS Class 2, are described in Bulletin 9819, eight pages. Selection tables are provided for the full line for both direct-connection and belt drive arrangements. *American Blower Co.*

### Servo Analyzer 2

Bulletin TDS 1100 describes a servo analyzer which combines a sweep generator and a multiple signal generator with a calibrated phase shifter, and tells how the instrument may be used to solve various control system problems. *Servo Corporation of America.*

### Power Conveyors 3

Described and illustrated in 23-page Bulletin 302 are 19 different types of power conveyors. Specialty items such as reciprocating hoists, live roller conveyors, enclosed slat conveyor tables, chain conveyors and limit switch rollers are also shown. *Harry J. Ferguson Co.*

### X-Ray Diffraction 4

Four-page brochure explains the basic theory and applications of X-ray diffraction, a method of analysis that utilizes the scattering of X-rays to determine the structure of crystals. *X-Ray Dept., General Electric Co.*

### Rust Preventives 5

Information on rust preventives and rust removers is contained in a 16-page booklet. Five comparison charts provide data on film thickness, air drying time, removal methods, and industrial applications. *Valvoline Oil Co.*

### Tubing Systems 6

Catalog 4305, eight pages, contains information, including charts and tables, to aid in the selection of tubing for various operating conditions; factors considered are flow requirements, pressures, temperatures, and nature of service. *Tube & Hose Fittings Div., Parker Appliance Co.*

### Air Cylinders 7

Catalog 110, 12 pages, contains engineering data on 21 models of non-rotating air cylinders, and also includes valves and accessories. Cylinders range from 1½ through 14 in. bore size. *The S-P Manufacturing Corp.*

### Engine Suspensions 8

Bulletin 506, six pages, describes the characteristics of a line of radial aircraft-engine suspensions; and includes detail assembly drawings, specifications, and maintenance instructions for the MR-36M suspension for use with R-2800 engines. *Lord Manufacturing Co.*

(Please turn page)

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## Speed Reducers 9

Manual B-6727, 44 pages, presents information on a line of speed reducers, including hp ratings, torque capacity, overhung load values, and installations for single, doubles, and triple reduction types. *Westinghouse Electric Corp.*

## Conveyors 10

Catalog 500, 47 pages, contains data on several types of conveyors, including an automatic elevator for handling small parts magnetically. *Prab Conveyors, Inc.*

## Press Unloader 11

A straight-line press unloader for a variety of stamping and forging press automation applications is covered in a four-page folder made available by *Press Automation Systems, Inc.*

## Welded Chain 12

Bulletin DH-319 gives the construction details of a new welded chain that is said to resist bending, breaking, and kinking, and can be used as a sling chain, banding chain, load binder, towing chain, and boomer chain. *American Chain Div., American Chain & Cable Co., Inc.*

## Molybdenum Chemicals 13

Bulletin Ch-27, four pages, presents information to help industrial users select the starting materials for molybdenum chemical applications such as catalysts, lubricant additives, and metal treating compounds. *Chimax Molybdenum Co.*

## Electric Motors 14

The latest design features of a line of open drip-proof motors in NEMA re-rated ratings of ½ to 40-hp (type G) and in non-re-rated ratings of ½ to 100-hp (types AP and APWW) are given in Bulletin 51B6210F released by *Allis-Chalmers Manufacturing Co.*

## Automatic Lubricators 15

Distribution systems for automatic machine tool lubricators are described and illustrated in Bulletin 4A, 12 pages. *Bijur Lubricating Corp.*

## Multi-Spindle Machines 16

Case histories of fourteen different types of work being produced on a line of machines, including drilling, tapping, milling, screw-inserting and assembly operations, are outlined in a 33-page presentation. *The Bodine Corp.*

## Ovens 17

Ovens designed for use in the automotive industry are described in 35-page catalog entitled "Ovens for Industry," which includes baking equipment for parts, accessories, battery plates and foam rubber among a large variety of other -industry applications. *The Kirk & Blum Manufacturing Co.*

## Micro Positioning 18

Electronic controls for automatically positioning the carriages of machine tools and controlling various production processes, are described in detail in new 12-page Bulletin 819 covering Inductosyn linear and angular micro positioning systems. *Farrand Controls, Inc.*

## Roller Bearings

Application data on a series of radial roller bearings is contained in a new 56-page catalog-manual. In addition to information on radial and dynamic capacities, the handbook gives for the first time the thrust capacities on the complete line. Address request on company letterhead to *Rollway Bearing Co., Inc., 541 Seymour St., Syracuse, N. Y.*

## Technical Bulletin

Publication of "The Wilco Tech Bulletin" has been started by a producer of electrical contacts, composite metals and special alloys. The first two issues will deal with silver-cadmium oxide contacts, including the results of recent development work. Address request on company letterhead to *The H. A. Wilson Co., 2655 U. S. Route 22, Union, N. J.*

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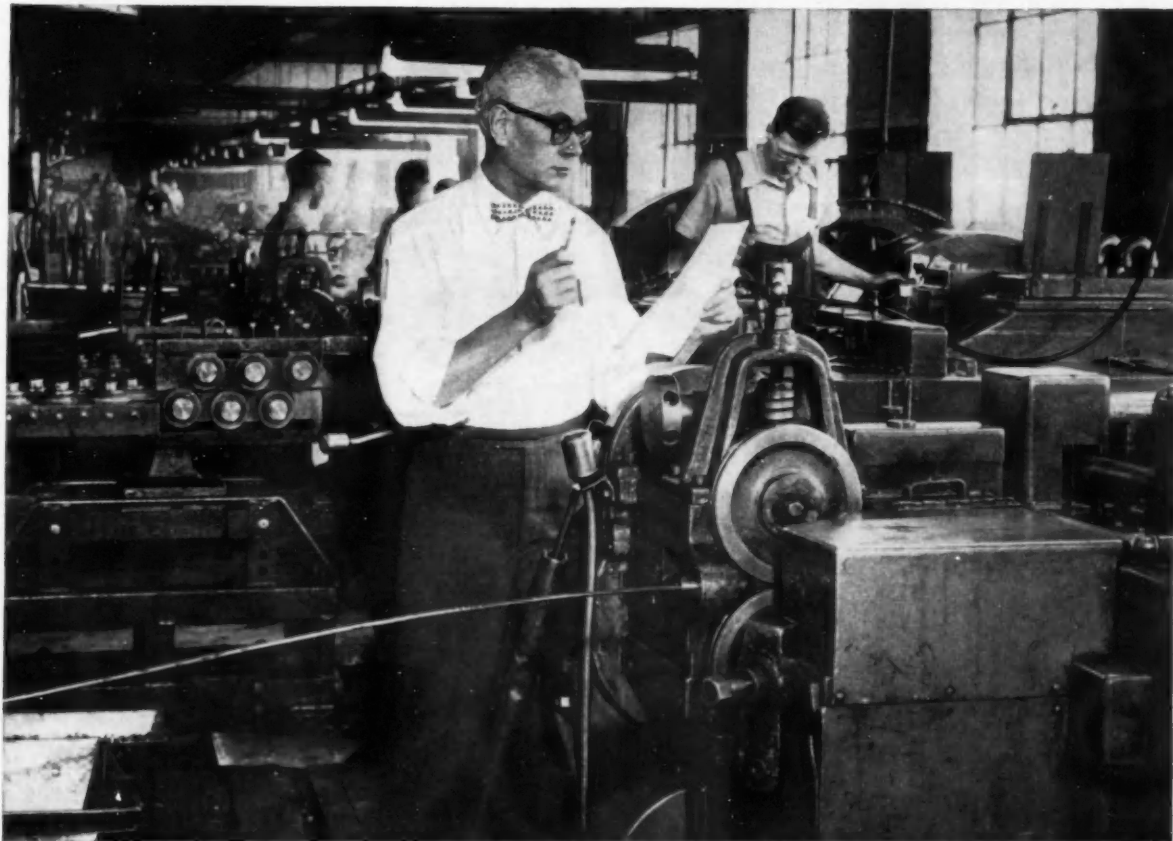
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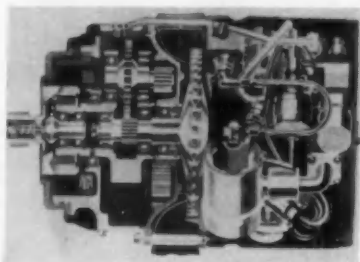
# PRODUCTS

## AUTOMOTIVE-AVIATION

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

### Gas Turbine Starter

Weighing only 46 lb and measuring but 12¼-in. in length and 8¼-in. in diameter, a miniature gas turbine has been designed for starting large aircraft gas turbines within 20 to 25



sec, permitting jet aircraft to operate to and from fields where no ground support is available.

The device, called the AS-18 fuel-air turbostarter, operates by taking high pressure air from an airborne bottle or ground supply, when available, mixing it with fuel drawn from the main tank of the aircraft, and then igniting the mixture. The resultant gases spin a small turbine at high speed. The turbine is connected through reduction gearing to the main engine shaft to accelerate it at the speeds required to sustain combustion. *General Electric Co.*

Circle 60 on postcard for more data

### Silver Alloy

Offering an unusual combination of excellent electrical and thermal conductivity, with retained hardness at elevated temperatures, a new oxidation-hardenable high silver alloy is a silver-magnesium-nickel composition normally consisting of about 99.53 per cent Ag, 0.27 per cent Mg, and 0.20 per cent Ni.

The outstanding characteristic of the alloy is that it is easily worked while soft and then irreversibly hardened by heating in air. Once hardened, the alloy is highly resistant to softening, has a low creep rate, and

for all practical purposes does not anneal at elevated temperature. In the as-received (annealed) condition, the alloy is soft like fine silver or copper, and finished parts can be formed by stamping, drawing, bending, spinning, etc., usually without anneals. If annealing is necessary, it can be done in 15-30 minutes in air at 700 F or in non-oxidizing atmosphere above 700 F. Permanent oxidation hardening is produced at 1200-1475 F, the time and temperature cycle dependent on the thickness of the piece.

Typical suggested applications for this alloy are: electrical contacts which can be attached by brazing without loss of hardness; shields and clips for miniature vacuum tubes requiring excellent thermal conductivity; instrument and relay springs, contact arms, wipers and sliders requiring high conductivity and hardness at elevated temperatures. *Handy & Harman.*

Circle 61 on postcard for more data

### Socket Screws

Micro sizes, from No. 0 to through No. 3, have been added to a line of heat-treated alloy steel socket cap and set screws, completing a standard range of socket cap sizes up to 3½ in. diam and of socket sets up to 1¼ in. In addition to cup points, cone, oval, half-dog and flat points are now available on the set screws.

Also being marketed is a line of socket head shoulder screws of heat-treated, alloy steel in standard diameter sizes from ¼ in. to ¾ in., and heat-treated, alloy-steel, tight-seal pressure plugs in standard pipe sizes from 1/16 to 1¼ in. Another new product is precision-ground dowel pins in standard and oversize diameters from ¼ through one inch.

A line of stainless-steel socket cap screws and socket set screws have also been put on the market. Socket cap and set screws in the new stainless line are made of 18-8 stainless steel, are non-heat-treated and non-magnetic. The cap screws, with

knurled head, come in diameter sizes from No. 0 to ¾ in. Fully formed threads are unified. Fit is 3A. Stainless set screws are available in sizes from No. 0 through ½ in. and come with cup point. *Cleveland Cap Screw Co.*

Circle 62 on postcard for more data

### Linear Bearings

Known as adjustable diameter ball bushings, new type ball bearings for linear motion are split longitudinally and designed to provide line-to-line or slight preload fits when mounted in an adjustable diameter housing. The objective of free-running no-play linear motion is said to be now practical as the bearings enable the tol-



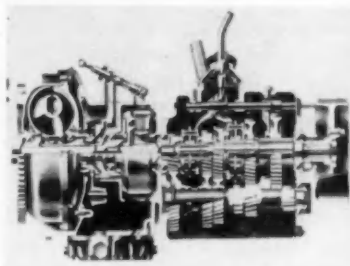
erance on the shaft diameter and bearing bore to be adjusted out. In addition, the principle provides for compensation for wear.

The bearings are frequently used in a housing that is split and provided with an adjusting screw. Drawings are available from the manufacturer showing numerous other arrangements which are being used in the design of machine tools, special machinery, small precision mechanisms and other devices. Adjustable diameter ball bushings are available in standard sizes for shaft diameters ranging from one inch to four inches. *Thomson Industries, Inc.*

Circle 63 on postcard for more data

## Power Train

For off-highway and stop-go operations, a new power train "package" called the TransVerter consists of a torque converter, hydraulic disconnect clutch and standard transmission. Said to be only eight inches longer than a conventional transmission and



clutch, the unit is usable with any make engine and is rated for engine torque output of up to 325 lb ft.

The torque converter in the TransVerter is a single stage, three-element type with a 2.57 to 1 maximum torque multiplication ratio. Its stator is equipped with an over-running clutch. The disconnect clutch is hydraulically-actuated and of the multiple disk type. Hydraulic pressure to the clutch is controlled by means of an "on-off" type of valve, a hydraulically-balanced spool type unit which can be operated by shift lever button or pedal raised slightly from the floorboard.

Transmissions available with the power train are: four speeds forward—one reverse, or four speeds forward—four speeds reverse; five speeds forward—one reverse, or five speeds forward—five speeds reverse with 2nd, 3rd, 4th and 5th speeds synchronized; five speeds forward and one reverse in a non-synchronized version; all with SAE No. 3 bellhousing. A variety of clutch and transmission controls, as well as transmission brakes, are also available as optional choices. Provision is made for SAE power take-off attachments, to be driven by the torque converter.

Clark Equipment Co.

Circle 64 on postcard for more data

## Truck Tire

A new line of truck tires with a steel wire shield between tread and carcass, designed especially for transit mixers, dump trucks and heavy service equipment used in logging, mining, quarrying and road construc-

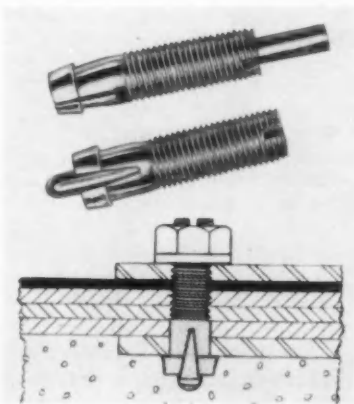
tion, has been announced. The steel shield protects the tread from cut and rupture damage, and virtually eliminates groove cracking, according to the company. An extra-deep tread also gives greater mileage. Wide angle grooves minimize stone retention. The tread has numerous biting edges to reduce skids, and to provide traction both on and off the highways. A new tread compound reportedly makes the tire exceptionally resistant to chipping, snagging, and cuts. Cross-bracing of the grooves also helps to arrest cut growth.

The steel shield Super Fleetmaster is available in sizes from 7.50-20 through 11.00-24. Larger sizes, ranging from 12.00-24 through 16.00-25, have a nylon cord body and are primarily for off-the-road use. The tire will also be constructed in tubeless design. United States Rubber Co.

Circle 65 on postcard for more data

## Blind Fasteners

"Drivebolt" fasteners are said to permit high-strength fastening in blind areas where standard bolts cannot be used. They are inserted from the nut side of the installation by first drilling a 0.377-in. diam hole, threading any standard  $\frac{3}{8}$ -24 nut loosely on the "Drivebolt," inserting the bolt into the hole and then driving pin flush with top of bolt. A blind head is thus formed behind the hidden side of the work. The nut is then wrenched up tight; a screwdriver may be inserted in the bolt slot to prevent turning, if necessary. Made of cadmium-



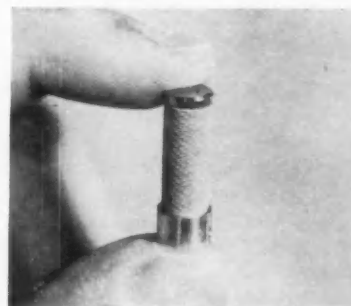
plated steel, two inches long, the unit consists of bolt and pin. Nuts are not supplied. Southco Div., South Chester Corp.

Circle 66 on postcard for more data

## Restrictor-Filter

A two-way filter-protected restrictor of new design for use in aircraft hydraulic systems contains a pair of tiny filter elements which remove particles larger than 0.008 in. in size from hydraulic fluid before it passes through the restrictor orifice and again as it returns from the hydraulic cylinder on its way to the reservoir.

Designed for 3000 psi operating pressures, the restrictor filter housing is constructed of one-inch aluminum hex material. Overall length of the



unit is  $3\frac{1}{16}$  in. and connections are for  $\frac{3}{8}$ -in. tubing in accordance with AND 10050-6 specifications. The stainless steel filter element (illustrated) is made of helically wound stainless steel ribbon type wire of special construction.

A one-way filter-protected restrictor is available where a rapid return flow is desired. The orifice in the one-way unit is located in a check valve piston which is spring loaded. Differential pressure in the return line causes the valve to open allowing the hydraulic fluid to return at the free flow rate. Purolator Products, Inc.

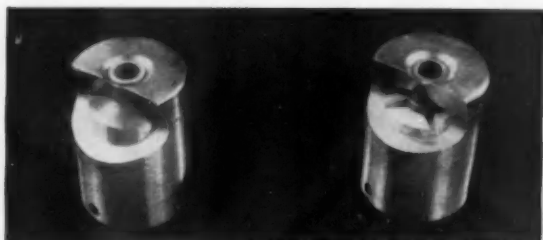
Circle 67 on postcard for more data

## Teflon Hose

The availability of industrial Teflon hose with detachable, reusable fittings has been announced. The hose is proposed for applications where unusual exposure to wide temperature ranges and chemical action is encountered. General applications include steam lines and other installations with fluid temperatures in the -100 F to +500 F range. The "super gem" fitting is detachable and reusable with hand tools. It is said to be leak-proof even after considerable aging at high temperatures and pressures. Aeroquip Corp.

Circle 68 on postcard for more data

## Improved Die for Coin Dimpling



North American Aviation's new, two-piece ram for coin dimpling (right) shown beside an old ram

**N**ORTH American Aviation, Inc., has developed a new, two-piece ram for coin dimpling that is said to last three to five times as long as one-piece rams now in use in the aircraft industry. It is much cheaper to replace.

Coin dimpling, a process used in making supersonic airplanes, consists of die forming a rounded recess, under pressure, on sheet metal so that flush rivets and countersunk screws lie flush with the surface and offer no wind resistance in flight. A hole is first punched or drilled, then dimpled. The ram portion of the die supports the dimple around the hole, thus eliminating cracking of the metal.

Dimpling with the present one-piece dies has sev-

eral disadvantages that the new ram has overcome. The old dies have tapered sides, which lessen accuracy under continuous use. North American's new die has vertical shoulders. The old dies also tend to collect metal fragments that eventually cause cracking. Because they are tapered and in one piece, they have to be made with a precision operation.

North American's new die has a hole drilled through the upper part, so that chips and fragments drop through to the slotted button base, instead of collecting around the sides as in the old dies. Simpler in design, the new die can be made on an automatic machine.

North American uses about 92,000 dies a year. Initial cost of the complete unit is about one-fourth that of the old die. The ram section, which is the only part that needs to be replaced, costs only about one-seventh as much as the old die. Thus, replacement cost has been reduced in North American's new die by about 86 per cent, which, taking in consideration its longer life, will result in estimated savings of thousands of dollars annually in replacement costs.

The unit has been thoroughly tested and is now in use on all the firm's dimpling machines. North American has applied for a patent and has licensed The Martin Aircraft Tool Co. of South Gate, Calif., to make the unit.

in the U. S. able to fabricate radioisotopes in strengths up to 10,000 curies (unit of measure of radioactive strength of a given source), the facility is a part of Budd's new Nuclear Systems Div. The division also produces radiography equipment for the non-destructive testing of metals, etc.

Establishment of the Nuclear Systems Div. is another step in the diversification program of Budd. The company is known most familiarly as a leading producer of automobile body components and stainless steel railway passenger cars.

Basically, the facility consists of a heavily shielded "hot" cell, a master-slave manipulator, a shielding window of more than 36 in. of high density glass, closed-circuit television, and miscellaneous equipment.

Fabrication in this sense means the building up in wafer, pellet, rod, and possibly other forms of strengths up to 10,000 curies of Cobalt 60, Cesium, Thulium, Iridium and other isotope materials and encapsulating them in specially designed containers for shipment and storage.

Among the industries which can

## Industry News

(Continued from page 39)

utilize radioisotope sources to study the influence of high intensity radiation on their products or processes are: food processing, brewing, pharmaceutical, antibiotic, synthetic resins, rubber, chemical and petroleum.

The Nuclear Systems Div. will maintain an inventory of the more common long-life isotopes in bulk form to expedite their fabrication. It will also design and build equipment for the controlled exposures of such sources, plus associated instrumentation and control apparatus.

### Aluminum Used Extensively Through 1957 Ford Models

The 1957 Ford car contains a considerable number of aluminum parts and components in cast, impact extruded, or rolled forms, according to a report issued by Aluminum Co. of America. For example, the engine

has eight aluminum pistons, while the Automatic transmission has no less than 21 aluminum parts. In addition, aluminum wheel cylinder pistons for the brake system are impact-extruded at Alcoa's Edgewater, N. J., works.

Body trim on the new Ford line is of anodized aluminum. It is visible in scuff plates on door sills, on front fender panels, door panels, and rear quarter panels.

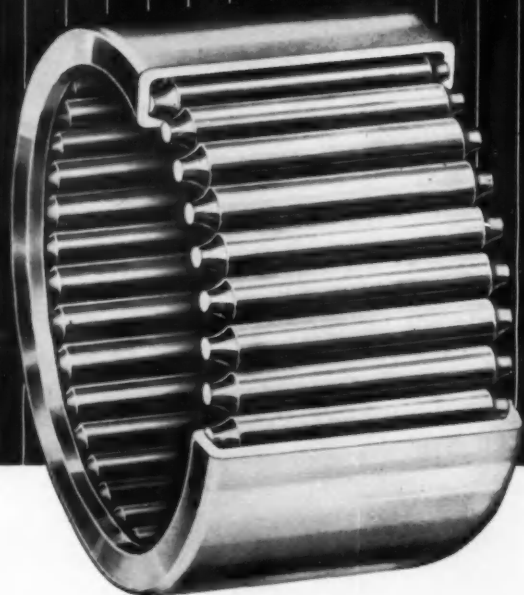
### Car Replacement Parts Sales 12 Per Cent Ahead Of 1955

Car companies and independent suppliers of automotive replacement parts report business substantially ahead of a year ago. The National Automotive Parts Association notes that sales up to July were 12 per cent ahead of 1955 and that it had its largest August in history.

GM, Ford, and MoPar also are substantially ahead of a year ago. Best industry estimates now indicate 1956 will top last year by eight to nine per cent.

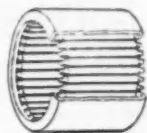
(Turn to page 174, please)

# here's why...



## TORRINGTON

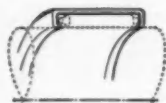
### DC needle bearings give high-capacity performance in minimum space



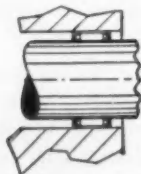
**Unique construction**—accurately drawn, surface-hardened shell retains rollers and serves as outer raceway.



**Full complement** of small diameter rollers—precision-ground and through-hardened—assures top capacity by distributing load over large number of contacts.

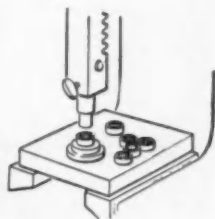


**Turned-in lips** of the case-hardened outer shell keep dirt and grit out, lubricants in—while retaining trunnion ends of rollers. All wear surfaces of outer race are case-hardened.

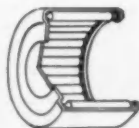


**No inner race** required on surface-hardened shafts—reduces space requirements, lowers unit costs.

**Simple assembly**—arbor press seats bearing in round housing bore. No collars, shoulders or retaining rings needed.



**Closed end type** DC Needle Bearings are available for stub shaft applications. The closed end provides a perfect seal at no extra cost.



Needle Bearings are made in a Precision Series for most applications and an Extra Precision Series where low radial play and minimum eccentricity are required. Easy lubrication through optional hole in shell or through hole in shaft assures long service life. Bearings can be pre-packed with suitable grease for those applications requiring grease lubrication.

See our new Needle Bearing Catalog in the 1955 Sweet's Product Design File—or write direct for Catalog No. 55.

**THE TORRINGTON COMPANY**  
Torrington, Conn. South Bend 21, Ind.

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## TORRINGTON BEARINGS



Needle • Spherical Roller • Tapered Roller • Cylindrical Roller • Ball • Needle Rollers

# A I R B R I E F S

By **RALPH H. McCLARREN**

## California Has Most Pilots

According to records of the Civil Aeronautics Administration, a total of 298,076 men and women hold valid CAA pilot proficiency tickets as of January, 1956. California is at the top of the list with 37,960 pilots; Texas is next with 19,792 pilots; New York is third with 18,543; Illinois, fourth with 17,773. Then come Ohio with 15,025, Pennsylvania with 13,813, Michigan with 12,296, and all other states with less than 10,000 active pilots each.

Of the total, 80,494 are students, 11,774 are airline transport pilots, 132,525 have private licenses and 72,957 have commercial ratings. The total also includes 100 helicopter pilots, 128 glider pilots, and 98 in the miscellaneous category.

## Proximity Warning Equipment

A proximity warning device for aircraft that will warn pilots whenever other airplanes are flying in their vicinity is being developed by Collins Radio Co. of Cedar Rapids, Iowa. A special committee formed by the airlines recommended the Collins design, after a careful study of the proposals submitted by several manufacturers.

The program to develop and produce a proximity warning device was accelerated by the recent collision between two commercial transport airplanes over Grand Canyon. It is interesting to note that the activities of this committee began in April 1955, some time before the Grand Canyon disaster.

## Air Traffic Control

In the interest of the private flyer, the Aircraft Owners and Pilots Association, an organization of 6000 members, has obtained the services of a consultant to assist it in carrying out policies concerning air traffic control. Mr. Victor J. Kayne, of Washington, D. C., who is recognized as one of the nation's leading experts on air traffic control, will help steer AOPA's activities.

AOPA has been vitally interested in the VOR-DME and TACAN controversy over the best possible system of air traffic control for civilian, military and transport flying. Interested, naturally, in the private flyer,

the association did not want to see the hundreds of presently installed OMNI direction transmitters eliminated by the military TACAN system. It would have resulted in more expensive installation of instruments in the private aircraft. AOPA has expressed favorable interest in the compromise air traffic control system currently referred to as VORTAC, a combination of the VOR (visual, oral range) system and the military TACAN system.

## Water Detects Surface Cleanliness

A method has been developed by which a single droplet of distilled water placed on metal can aid in determining whether or not the metal has a clean surface. An optical instrument is used to measure the angle of elevation of the droplet of water on the metal. The higher the angle, the dirtier the surface; the lower the angle, the cleaner the surface. The cleanliness test is necessary to assure full-strength bonding of metal to metal in structures of modern jet bombers. Use of the water droplet method eliminates the expensive tests formerly made to assure proper bonds between the metal parts.

## 300,000,000 Passengers

The scheduled airlines of the United States have compiled a notable record of passenger travel in the past six years. On July 29, 1956, the scheduled airlines carried their 300 millionth passenger. The scheduled airlines carried their 200 millionth passenger only two years ago, and their 100 millionth, only six years back. Even more astonishing, though, is the fact that it took the airlines 24 years to accumulate their first 100 million passengers.

## Jet Engine Noise

It is encouraging to see that something is being done about the noise produced by jet powered aircraft. Aircraft manufacturers and operators have developed such devices as a "blast fence" with acoustic treatment, a special "run-up pen," and complete enclosures around the engine or behind the aircraft, which contains sound absorbing materials to lessen the noise level of the jet engines.

*(Turn to page 128, please)*

# CUSTOMER SPECIFIED

One of the nation's leading manufacturers of communications equipment needed a way to increase production milling of telephone relay frames, reduce unit costs and greatly improve product quality. They called on Kearney & Trecker to solve this problem.

## KEARNEY & TRECKER MILWAUKEE® DESIGNED

Here's Kearney & Trecker's answer: Two 6-Station Rotary Indexing machines which mill 24 surfaces on cast iron telephone relay frames within plus or minus .002" at a combined rate of 360 pieces per hour. Former methods produced only 150 relay frames per hour.

An important cost-saving feature of each machine is the application of standard units — five feed slides and a 48" rotary index table. Such utilization of standard units lowered initial costs, simplified maintenance and increased efficiency.



Color indicates machined surfaces.



## High-volume, low-cost production starts with Kearney & Trecker Milwaukee machine tools

Kearney & Trecker automatic production machines accurately perform many operations at lower cost. But most important to you, this is accomplished by combining standard design components — feed slides, way-type drill units, tapping units, quill feed units, rotary index tables — that keep initial machine costs at a minimum. You get the production you want and the econ-

omies you need from job-proven designs. What's more, you get performance to exacting accuracies.

Take advantage of our abilities. See how they can pay off in new profits for you. Whatever your production machine needs, call our representative or write: Special Machinery Division, Kearney & Trecker Corp., 6774 W. National Ave., Milwaukee 14, Wisconsin.

For more information on machine illustrated, ask for Data Sheet No. 1083. A new bulletin, SMD-56, which describes many of our outstanding machine designs, is also yours for the asking.



*Special Machinery Division*

MILWAUKEE 14, WISCONSIN, U.S.A.

**Designers and Builders of Precision and Production Machine Tools Since 1896**

# The BUSINESS PULSE

*Near-Term Business Outlook Remains Favorable Despite Continued Sluggishness in Security Prices, Federal Reserve's Tight Money Policy, and Home Building Inactivity. Sufficient Credit Appears to Be Available for Sound Investment Planning*

This Survey Is Prepared  
exclusively for AUTOMOTIVE  
INDUSTRIES by the Guaranty  
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The performance of business in recent weeks has generally tended to lend support to the view that economic activity is likely to undergo its customary seasonal expansion over the remainder of the year. The vigorous rebound that occurred in industrial production during August after the steel strike ended appears to have carried over into the post-Labor Day period, while at the same time retail trade has been maintained at record volume. This combination of strong production and sales trends has worked to keep the flow of income on an upward gradient and to maintain highly gratifying conditions in labor markets.

Now, with steel output once more pushing against the capacity barrier and with the automobile industry poised for a sharp expansion of new-model production, there is widespread confidence among businessmen respecting the near-term outlook. The judgment is apparently almost universal that a continuation of prosperous conditions is assured for the months immediately ahead. This may perhaps seem somewhat inconsistent with the faltering performance of the stock market during August and September, but the contradiction is generally judged to be more apparent than real.

## Security Prices

The fact of the matter is that the stock market has been subject to special influences of late, many of which are essentially technical in character. Before this most recent sluggishness in security prices appeared, there had been considerable feeling on the part of analysts that prices had climbed to levels which rendered them technically vulnerable, judged, say, on the basis of traditional times-earnings ratios or on the basis of the competitive relationship between stocks and fixed-income-bearing obligations. When the competitive position of stocks was further weakened

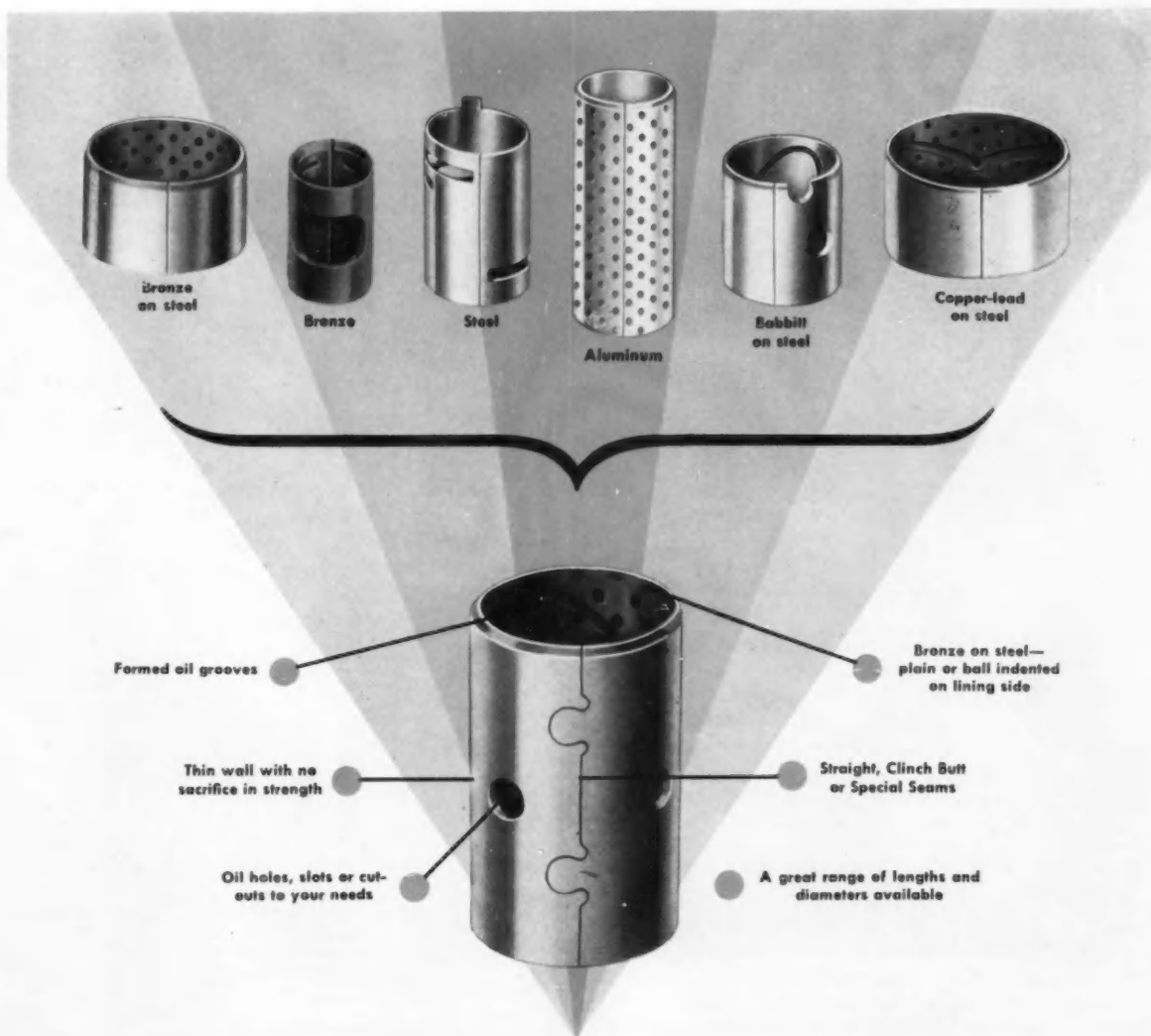
by the widespread August increases in interest rates, it was understandable that investors' interest in stocks waned. This fact, together with the uncertainties engendered by the Suez crisis and the forthcoming national elections, provides a plausible explanation for at least a considerable part of the weakness in security prices. There is no reason to assume, however, that these factors, which have been unsettling in so far as the stock market is concerned, have had a similar effect on the attitudes of businessmen regarding near-term economic tendencies. Indeed, as has already been indicated, business confidence respecting the near-term outlook is strong, reflecting the buoyant trend of recent economic activity.

There are, admittedly, some things in the present situation of a rather dubious nature—such as the quiescent trend of home building, the evidences of inflation, and the uncertain impact on investment of the higher rates of interest—but in each such instance there are arguments against anticipating a serious near-term negative influence on general business. Home building, for example, has been comparatively quiet for a year now without as yet seriously affecting over-all business, and if negative effects should in fact ensue from inflationary pressures they would probably take time in emerging. Possible consequences from these sources, therefore, would seem to be more a matter of concern for 1957 than for the balance of the present year.

## Investment Plans Uncertain

There is really no concrete basis for judging the ultimate consequences of the recent increases in interest rates and the limited availability of credit which the higher rates reflect. Traditionally, economists have reasoned about investment undertakings as if businessmen made nice adjustments in their investment plans as changes occurred in the relationship between the expected rate of profit from investment and the rate of interest. This implies that an increase in the rate of interest, other things being equal, will lead to a canceling or deferral of some investment plans. But this theoretical proposition is not of much help to the would-be forecaster, because, even if valid, there still remains the problem in any specific business

*(Turn to page 117, please)*



## Bearing Performance with Bushing Economy

Any of these design features can be incorporated in our plain or bi-metal bushings. For many applications lower cost bushings

provide the needed bearing characteristics at a distinct price advantage. We provide a complete engineering service. Address:

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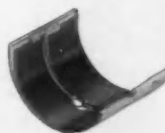
BABBITT-LINED  
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SPACER  
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RESEARCH • DESIGN • METALLURGY • PRECISION MANUFACTURING

**W**ITH three new V-8 engines, Chevrolet's 1957 truck line ranges from pickups and sedan deliveries to large tandems capable of performing on or off the highway, and has been expanded to an all-time high of 88 models on 22 different wheelbases.

A new 175-hp, 283 cu in. Super Taskmaster V-8 is offered as optional equipment on a wide range of the company's 43 medium-duty and 21 heavy-duty models.

Standard equipment on many of the models is the new Taskmaster V-8 which develops 160 hp. Both engines have 8-to-1 compression ratios. The optional higher horsepower is attained through a four-barrel carburetor, dual exhaust system and special intake manifold.

The third new engine, a high-torque 322-cu-in. V-8 called the Super Loadmaster, delivers 210 hp—15 hp higher than any previous Chevrolet truck. Equipped with a four-barrel carburetor and dual exhaust, the engine is available as an option on the larger heavy-duty models, which have maximum ratings of 32,000 lb gross vehicle weight (GVW) and 50,000 lb gross combination weight (GCW).

Offered as standard equipment on the larger heavy-duty models is the 195-hp Loadmaster V-8 introduced last year. Along with the three new V-8's, this power plant features specially treated score-resistant connecting rod bearings and front and intermediate main bearings offering much longer life. Combined with four engines available on light-duty and small medium-duty models—three six-cylinder engines and a 155-hp V-8—the selection of truck engines for 1957 comes to a total of eight, two more than last year. In addition, a wide selection of passenger car engines is available on the sedan delivery.

Eight truck transmissions are available, including an automatic drive for virtually every model. Chevrolet's six-speed Powermatic transmission, with a built-in retarding device that gives down-hill speed control without use of brakes, is optional on larger trucks and school buses.

A second automatic transmission—Hydra-Matic—is offered in two sets of gear ratios for light-duty and smaller medium-duty models. A range of six manual transmissions make up the other choices, one featuring overdrive as an option on half-ton models.

New safety features throughout the line include interlocking latches on all side doors

## Chevrolet's Truck Line Expanded to All-Time High

and steering wheel hubs recessed three inches below the rim.

Full air brakes are offered on many of the heavy-duty models. The system contains an air compressor that not only supplies two air tanks on the truck itself but can be hooked up to supply air brakes on attached trailers. The air brakes are offered as an option in conjunction with new cast-spoke truck wheels.

An extra large four-by-five-inch brake treadle is offered on the two new medium-duty forward control models. These chassis, the largest of their type ever built by the company,



**Chevrolet 10403 chassis and cab with tandem option**

place the driver almost directly above the engine to leave maximum space for cargo. The models are available in 130 and 154-in. wheelbases, with GVW ratings ranging from 14,000 to 18,000 lb. Base engine is the six-cylinder 261-cu-in. Jobmaster with an 11-in. coil spring clutch.

Stronger springs, axles and shock absorbers are provided on many of the models. An optional front axle of 9000 lb capacity is offered for the first time on the tandems.

### Congressional Crossroads

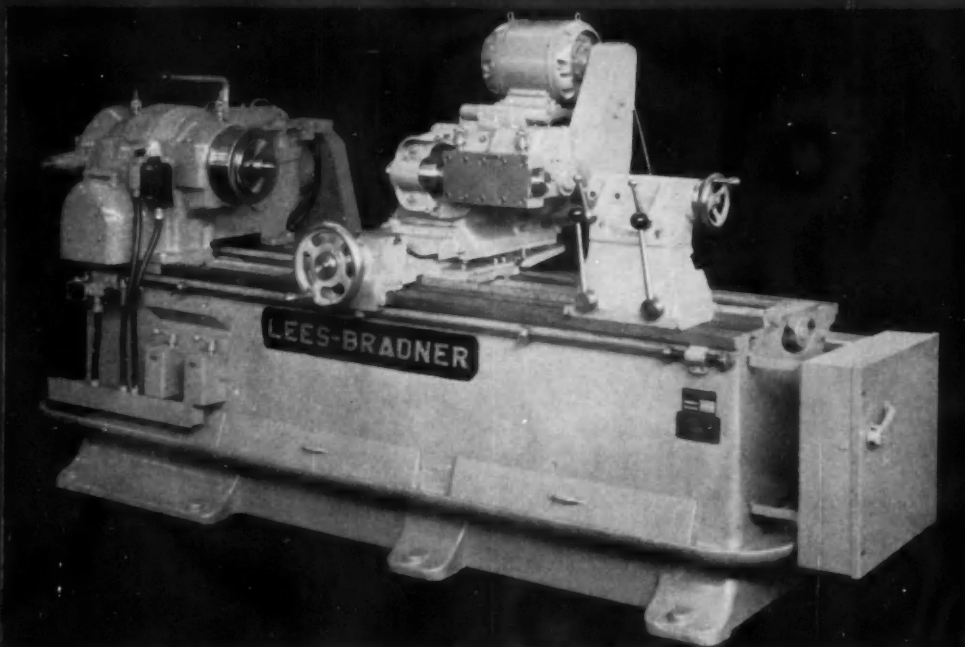
Congress next year may try to grasp firmly one of the most prickly economic problems of this decade. Simply stated, it is how the Government should begin to back away from a huge \$36-billion-a-year defense program without either inviting enemy attack or without setting off a business recession.

This WORM...



will turn better... thanks to...

## THE LEES-BRADNER HT



Building precision into other machine tools is the unique distinction that can be claimed for The Lees-Bradner Model HT Thread Milling Machine.

The worm illustrated above was produced on this machine by the Cleveland Worm and Gear Co. in one hour 23 minutes at a cutter spindle speed of 61 R. P. M. The pitch diameter of the worm was 3.728" with an outside diameter of 4.625".

Many tough thread milling problems like this have been, and are being, solved by this remarkably versatile machine.

Contact us or your local Lees-Bradner representative for complete information on fast, precision threading with the Model HT Universal Thread Milling Machine.

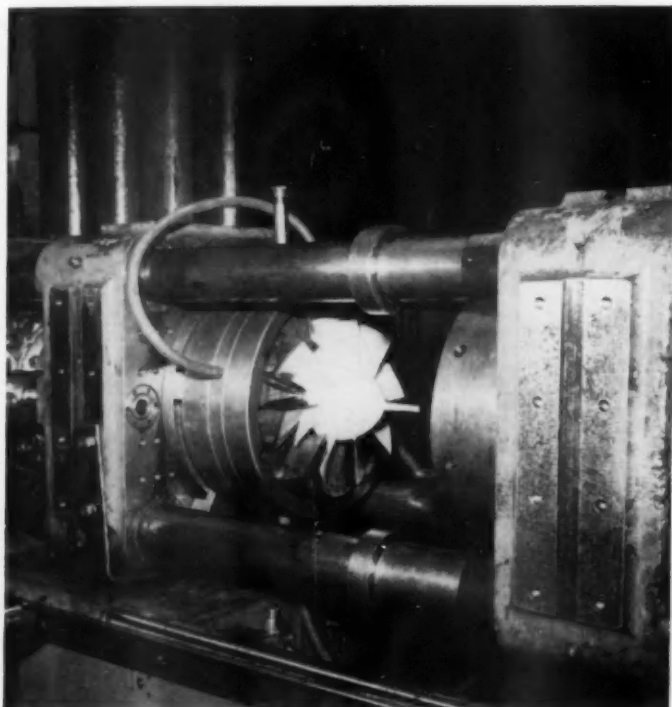
### Details on Worm Gear Production

Hob Spindle Speed	61 R. P. M.
Circular Pitch	1.420"
Pitch Diameter	3.728"
Outside Diameter	4.625"
Threading Time	1 hour 23 min.
Material	2315 Steel
Weight of Worm	51.76 lbs.

# the LEES-BRADNER

CLEVELAND 11, OHIO, U.S.A.

Company



A nylon fan in the large molding machine

**A**FTER three years' extensive testing of fans and instrument panels of plastics, Citroen, of Paris, France, has made these parts standard equipment in its Model DD 19 passenger car.

The fan is molded of nylon powder—costing the equivalent of \$2 per pound in France—for its great strength. The same material goes into the upper part of the instrument panel for its resistance to the infra-red rays used in drying paints, making it possible to finish cars with the part in place.

The plastic fan has been tested at speeds of up to 12,000 rpm. Weighing only 300 grams, it is much lighter than a metal fan.

At the Marseilles plant of the Manufacture Provencale de Matieres Plastiques an Italian Fimsai semi-automatic machine turns out a fan every 90 seconds. As it is taken off the mold while still hot, it is imperative to cool down the part upon a form, to avoid deformation.

The mold has to be kept at a constant 80 C at all times, thus the work at the

## Fans and Instrument Panels Molded of Plastics

**By Maurice Moyal**



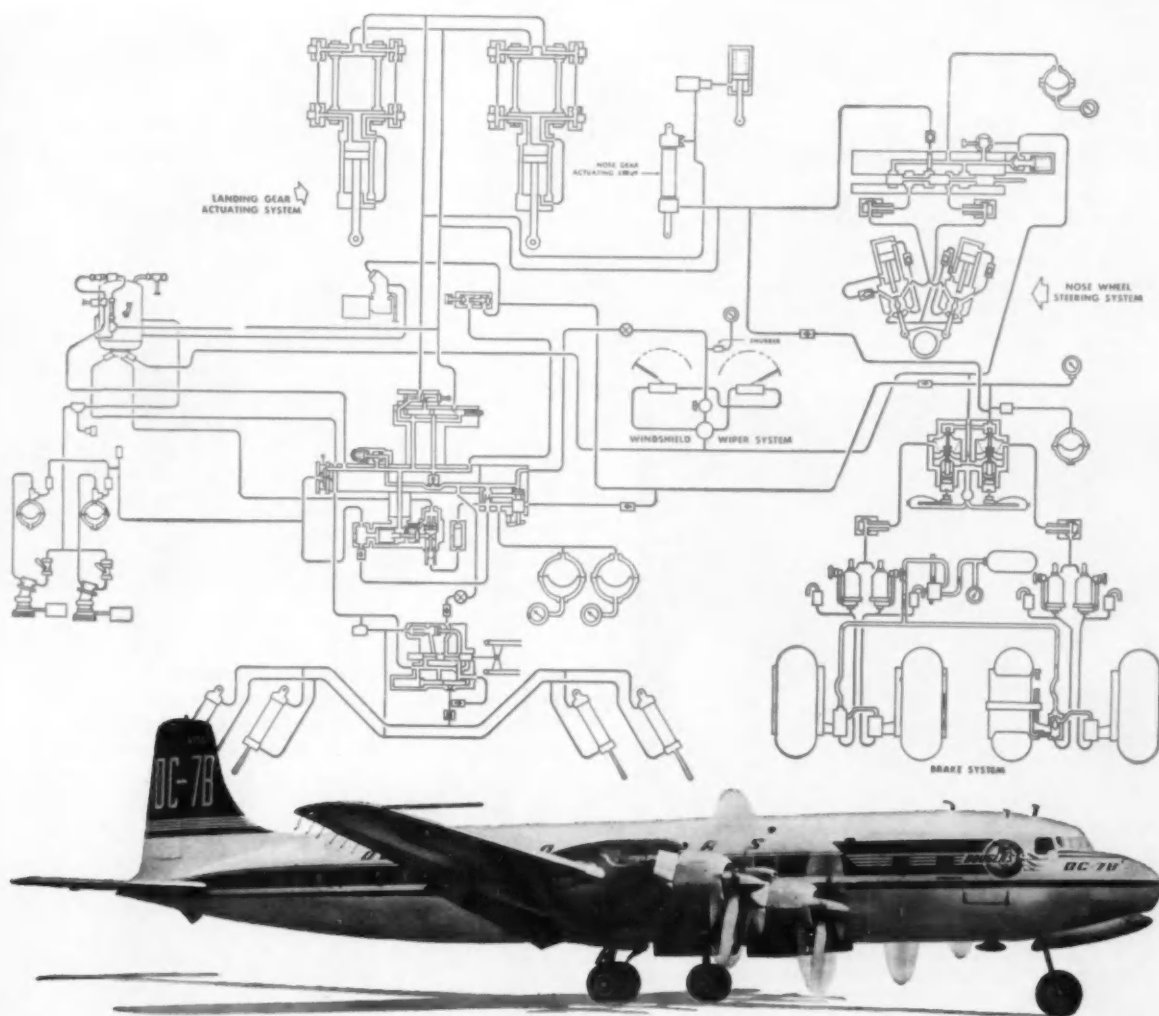
Upper part of instrument panel on special form to preserve shape during cooling

plant proceeds around the clock in three eight-hour shifts. If production were stopped at night, the temperature of the mold would be down in the morning, and it could take five to six hours to get production under way again.

An upper part of the instrument panel is also turned out every 90 seconds. Its 58 in. length makes it one of the largest single pieces molded out of nylon.

Four tons of special steels have gone into the big mold, which is fitted into a mammoth press. More than seven meters long, it weighs over twenty metric tons.

The lower part of the instrument panel, around and under the steering-wheel, is made of kralastic, a novel synthetic material. This thermoplastic is a mixture of synthetic rubber and styrene. It can be molded by injection, as well as by compression and extrusion. Kralastic is supplied by the Etablissements Arnaud, Paris.



## Enjay Butyl rubber— vital artery in newest airliners

Douglas chooses Enjay Butyl for rubber components of the hydraulic systems in many of its famous DC-7 airliners. These components, which help assure the dependable operation of everything from wing flaps to landing gear, are proving over millions of air miles their durability and resistance to wear.

Versatile Enjay Butyl rubber may well have a place in *your* operation. It will pay you to investigate the many technical advantages it has over other types of rubber. Its price and ready availability are advantages, too. For full information, and for technical assistance in the uses of Enjay Butyl, contact the Enjay Company today.



*Pioneer in Petrochemicals*

**ENJAY COMPANY, INC., 15 West 51st Street, New York 19, N. Y.**  
Other offices: Akron • Boston • Chicago • Los Angeles • Tulsa

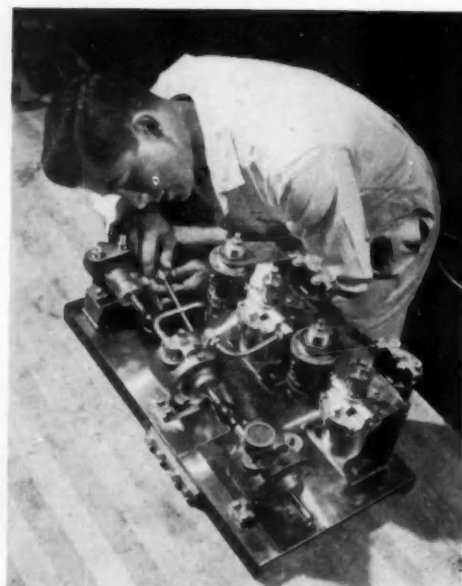


Enjay Butyl is the super-durable rubber with outstanding resistance to aging • abrasion • tear • chipping • cracking • ozone and corona • chemicals • gases • heat • cold • sunlight • moisture.

# Ford's New Laboratory for Development of Fuel Systems



Ford engineer places a rubber stopper in an air-intake orifice on the control panel of a carburetor flow stand, one of five such test installations in the new laboratory.



Laboratory technician tightens up a fuel and vacuum pump installation used for special fuel injection tests.



Here the engineer is testing high altitude performance of a carburetor. Actually, he is only a few hundred feet above sea level in the laboratory. Rarified atmosphere can be duplicated within the vacuum-tight enclosure.

ONE of the automobile industry's most modern induction systems laboratories for testing the flow of fuel and air in engines has gone into operation at Ford Motor Company's research and engineering center in Dearborn, Mich. The new laboratory also provides facilities for expanded fuel injection development programs for the company's experimental engines.

Ford engineers at the new laboratory conduct their tests in five special rooms which are equipped with fuel and air flow measuring stands. A number of different tests are run continuously on both carburetion systems and fuel injection systems.

All five rooms are identical in their equipment and contain: 1. An air flow measuring device consisting of seven calibrated orifices and an inclinometer which measures the number of cubic feet of air which flow through a given set of orifices in one hour. The cubic foot measurement is later converted into pounds. 2. A fuel flow meter with a measuring capacity of 0.6 lb to 350 lb of fuel per hour. 3. Altitude valves to simulate altitude conditions from sea level to 15,000 ft. 4. Fuel pressure regulators to regulate pressure from zero to 100 psi. 5. A "Chronotach" to measure injection pump revolutions and for timing injection pump tests. 6. A drive for operating injector pumps at speeds up to 3000 rpm. 7. Manometers for measuring pressure drops as air passes through induction system components. 8. A hydraulic throttle control. These stands also are used to measure air cleaner restrictions and manifold restrictions.

Each of the stands has a companion pump room equipped with: 1. Forty horsepower motors for the vacuum pumps, which can pull 750 cu ft of air per minute. 2. A tangential separator to separate gasoline used in the tests from the air. 3. Another separator to separate the water from air. Water is picked

(Turn to page 136, please)

# Acme-Gridley

**fully automatic turret lathe . . . gives you  
increased production in inverse ratio to cost**

This customer chose a model MR Acme-Gridley to produce this packing gland nut, because he was able to increase his production by more than 3 times that of the former method.

The Acme-Gridley automatically controlled cycle is predetermined to give the minimum time per piece, on *every piece*. Because each tool-slide is independently cammed and selective spindle speeds are automatically controlled, machining can be done at the surface speed best suited for required finish and tolerance.

WRITE today for your free copy of new Bulletin MR-56. See why Acme-Gridley Basic Design lets you increase production and lower unit costs.



#### JOB FACTS

Packing Gland Nut  
from 4 1/4" round  
1112 C.D. Steel.

12 Operations (with 9 tools) including threading and tapping.

Former Method produced 409 pieces in 192 hours on hand operated machine.

On Model M Acme-Gridley—325 pieces in 48 hours.

Savings—7 to 2 production increase at better than 3 to 1 savings in cost per piece.

# National Acme

THE NATIONAL ACME COMPANY, 173 EAST 131ST STREET, CLEVELAND 8, OHIO

SALES OFFICES: • Newark 2, New Jersey • Chicago 6, Illinois • Detroit 27, Michigan

## New Defense Facilities

**S**UPPLEMENTING the list of Certificates of Necessity issued up to August 8, authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which was published in the September 15 issue, page 118, of **AUTOMOTIVE INDUSTRIES**, the following additional certificates were announced by the Office of Defense Mobilization, covering the pe-

riod which extends from August 9 to September 19, inclusive.

The figure appearing in parentheses is the percentage authorized in respect to actual fast tax write-offs.

**ALL AMERICAN ENGINEERING CO.**,  
Wilmington, Delaware

Military aircraft parts—\$62,661 (70)

**AMERICAN STANDARD PRODUCTS, INC.**,  
Hartford, Conn.

Military aircraft engine parts—\$84,620 (70)

**BENDIX AVIATION CORP.**, Eclipse Pioneer  
Div., Teterboro, New Jersey

Research and development—\$339,493 (65)

**BENDIX AVIATION CORP.**, Scintilla Div.,  
Sidney, New York

Military aircraft parts—\$42,627 (65)

**BOEING AIRPLANE COMPANY**, Renton,  
Washington

Aircraft—\$12,000,000 (60)

**BOEING AIRPLANE COMPANY**, Seattle,  
Washington

Military aircraft—\$5,111,000 (120)

**BORG-WARNER CORP.**, Norge Div., Musk-  
egon Heights, Mich.

Military aircraft parts—\$110,227 (65)

**BURNDY ENGINEERING CO., INC.**, Mil-  
ford, Conn.

Military aircraft parts—\$785,000 (50)

**DOUGLAS AIRCRAFT CO., INC.**, Long  
Beach, Calif.

Aircraft—\$18,767,800 (60)

**FAIRCHILD ENGINE AND AIRPLANE  
CORP.**, Fairchild Aircraft Div., Hagers-  
town, Maryland

Military aircraft—\$201,887 (65)

**GENERAL DYNAMICS CORP.**, Convair  
Div., San Diego, Calif.

Research and development—\$1,736,295 (120)

**HARTMAN ELECTRICAL MANUFACTUR-  
ING CO.**, Mansfield, Ohio

Relays for military aircraft—\$214,225 (45)

**HUFFORD MACHINE WORKS, INC.**, El  
Segundo, Calif.

Aircraft parts, military—\$206,240 (60)

**HUGHES AIRCRAFT COMPANY**, Culver  
City, Calif.

Military electronic systems—\$441,912 (65)

**KEARNEY & TRECKER CORP.**, West Allis,  
Wis.

Special machine tools for the Military  
Service—\$1,056,000 (65)

**LOCKHEED AIRCRAFT CORP.**, Palmdale,  
Calif.

Military aircraft—\$3,705,298 (65)

**LOCKHEED AIRCRAFT CORP.**, Missile Sys-  
tems Div., Van Nuys, Calif.

Research and development—\$996,259 (65)

**LOCKHEED AIRCRAFT CORP.**, Georgia  
Div., Marietta, Georgia

Military aircraft—\$1,252,310 (130)

**MINNEAPOLIS-HONEYWELL REGULATOR  
CO.**, Pinellas County, Fla.

Control systems for military aircraft—  
\$3,299,900 (60)

**NORTHROP AIRCRAFT, INC.**, Hawthorne,  
Calif.

Research and development—\$5,709,500 (65)

Military aircraft—\$79,101 (65)

**RYAN AERONAUTICAL COMPANY**, San  
Diego, Calif.

Military aircraft—\$52,394 (125)

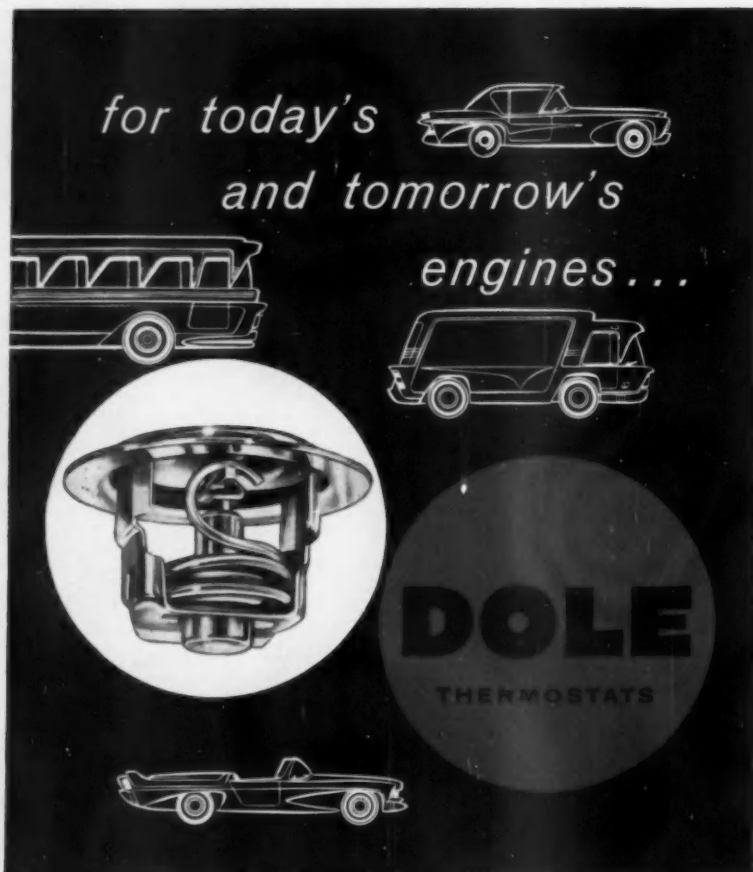
**SOLAR AIRCRAFT COMPANY**, San Diego,  
Calif.

Military aircraft engines—\$1,548,245 (65)

**WESTON HYDRAULICS, LTD.**, North Holly-  
wood, Calif.

Aircraft parts—\$62,786 (65)

for today's  
and tomorrow's  
engines...



**DOLE**  
THERMOSTATS

these are the reasons why Dole Thermostats are standard equipment on 37 of the leading makes of cars, trucks, tractors, commercial vehicles, industrial and marine engines.

- Positive operation against increased pump pressures
- Good service with all types of antifreeze solutions
- Help maintain best engine performance
- Speed warm-up and get more heat from the car heater.

Write for information.



**THE DOLE VALVE COMPANY**  
1901 Carroll Avenue  
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**DOLE**

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## AUTOMOTIVE INDUSTRIES . . .

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Automotive and Aviation

**MANUFACTURING**



we do

one thing—

and we do it very well!



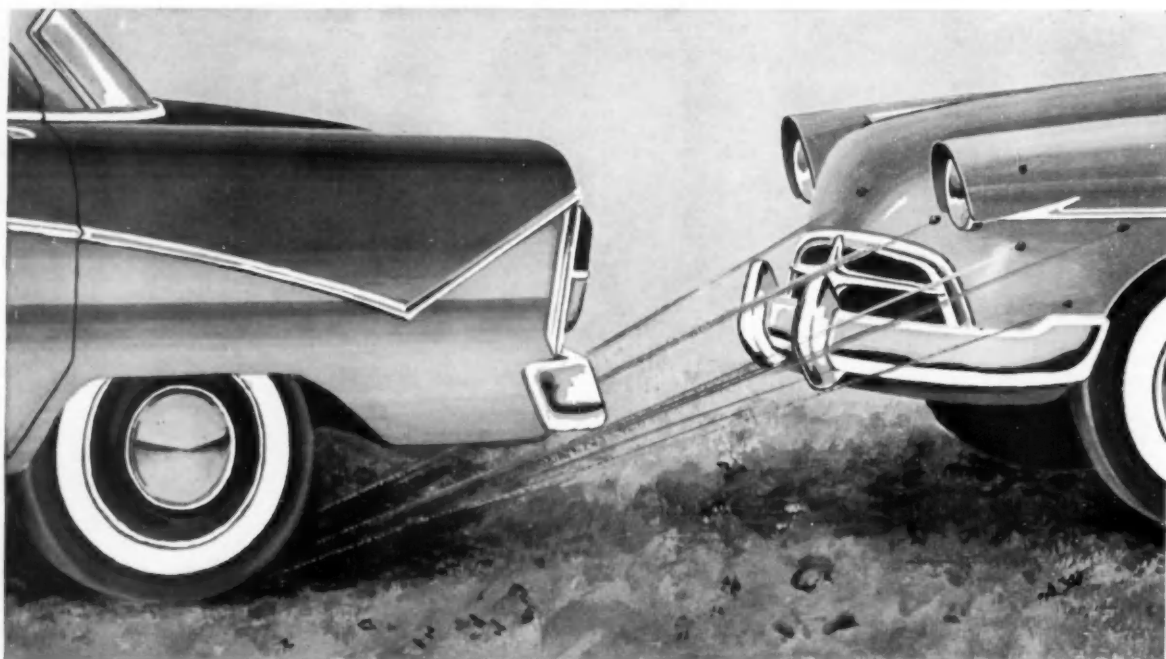
STRIP STEEL production is our specialty. From this you gain special benefits: experienced counsel on your strip applications...dimensional exactness...uniform quality, to speed product fabrication...the finish you want, in every coil. For superior quality and superior service in stainless, spring, alloy or clad metal strip steels call *Superior!*

76

**Superior Steel**

CORPORATION

CARNEGIE, PENNSYLVANIA



## NEW HIGH IN IMPACT-RESISTANCE

under organic finishes:

### Pennsalt FOSBOND zinc phosphate coatings

Rough treatment, chipping impacts, severe weathering and corrosion—those old paint-damaging standbys—are no longer bogeys to the organic finishing operation. Pennsalt's know-how in metal surface preparation has produced a series of FOSBOND® zinc phosphate coatings that protect steel surfaces against these abuses better than other methods thus far developed.

If your problem is impact . . . corrosion . . . other chemical and physical conditions that wreak havoc on

paint adhesion—there's a Fosbond cycle to meet it, at low cost and without any change in your present equipment.

Let the man who knows look at your phosphating problem! He's from Pennsalt, where the greatest store of metalworking chemical knowledge is ready to help you. Call him or write Metal Processing Dept. 365, Pennsylvania Salt Manufacturing Company. East: Three Penn Center Plaza, Philadelphia 2, Pa.; West: 2020 Milvia Street, Berkeley 4, Calif.

In Canada: Pennsalt Chemicals of Canada, Hamilton, Ontario.



Metal Cleaners • Phosphate Coatings • Cold-Working Lubricants



**CHIP-RESISTANCE.** Finishes on Fosbonded panels resist twice the weight of impact as do finishes applied over conventional zinc-phosphate coatings.



**SALT-SPRAY TEST.** No creep of corrosion on Fosbonded panel after 300-hour exposure, while conventional zinc phosphate allows 1/16" undermining of paint film.



**IMPACT TEST.** No paint fractures on impact and bending of Fosbonded panel (left), while paint on panel with conventional coating fractures from same treatment.

A B E T T E R S T A R T F O R Y O U R F I N I S H

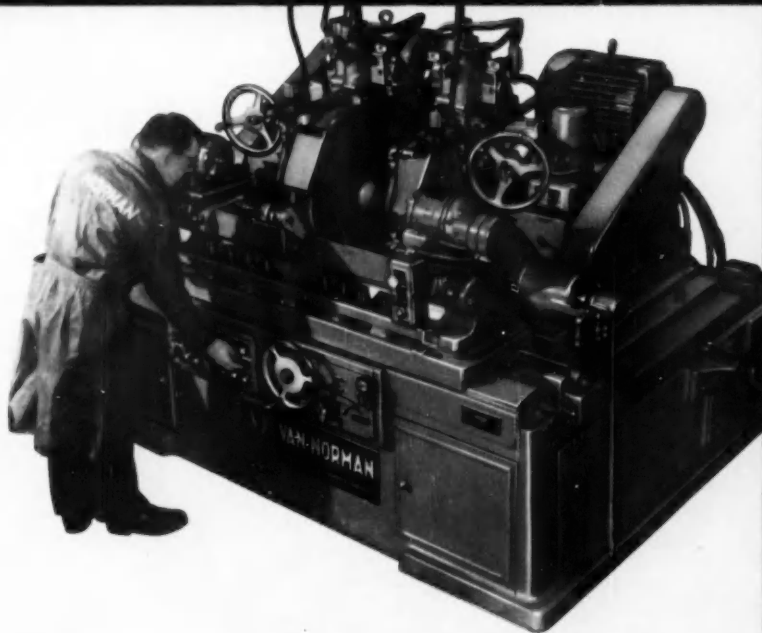


## Another Manufacturer Chooses G-E Control For Automotive Industry Machines



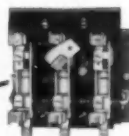
This General Electric factory-built panel provides accurate, reliable control for a new Bowgage Production Grinder, manufactured by the Van Norman Co., of Springfield, Mass. The panel incorporates standard, high-quality G-E starters, relays, switches, and other devices for such functions as interlocking, sequencing, and counting for the automatic dressing cycle.

The control panel circuitry is designed so that this high-production Van Norman machine can grind any automotive part that can be readily chucked. The grinder can remove 0.022 inches on a 1 1/8-inch diameter piece, and with operator-initiated automatic clamping can have a new piece ready for grinding every 15 seconds—while holding a 15 micro-inch finish.



**GENERAL**  **ELECTRIC**

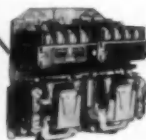
G-E panels for machines like this meet JIC specifications. For some of the devices used in General Electric automotive panels, see the next page.



**FUSED DISCONNECT SWITCH** — double-break contacts easily visible for inspection—poles can be replaced individually—kits available for changing fuse clips to accommodate other current ratings and voltages.



**MAGNETIC STARTER** — completely inspected and serviced from the front—easy-to-change heavy silver contacts—exclusive Strongbox coil protected against oil, dust, and accidental damage.



**REVERSING STARTER** — in addition to the mechanical interlock which prevents forward and reverse contactors from closing at the same time, electrical interlocking can be supplied when specified at no extra cost.



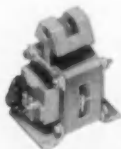
**LATCHED-IN RELAY** — main and latch coils both have Strongbox construction for long coil life, greater dependability.



**MACHINE TOOL RELAY** — contacts easily changed from normally open to normally closed—front-connected saddle-clamp terminals make wiring easier—high dependability and easy servicing reduce maintenance—spring attached to movable contacts facilitates installing or removing contacts, assures proper tip pressure.

## G-E CONTROL for the Automotive Industry

In addition to those shown above, G-E devices include:



● **STRONGBOX SOLENOIDS** with coils molded in polyester resin for longer life, better protection against dust, water, and oil.



● **OIL-TIGHT PUSH BUTTONS** with self-aligning contacts that increase life 2:1—proved by actual load tests.



● **PNEUMATIC TIME-DELAY RELAY** with contacts rated at 25 amps. Wide range of settings from 0.2 to 180 seconds—can be changed to time delay after de-energizing without additional parts—instantaneous interlocks available.



● **6-POLE MACHINE TOOL RELAY** has the same mounting dimensions as 4-pole form—wired from four directions—captive, saddle-clamp terminals, accessible from front, make wiring easy—3-slot mounting.

High quality General Electric control helps protect against interrupted operation and unscheduled shut-downs. Designed and constructed for long operating life, G-E devices assure you of the reliable control required by high-production automotive equipment.

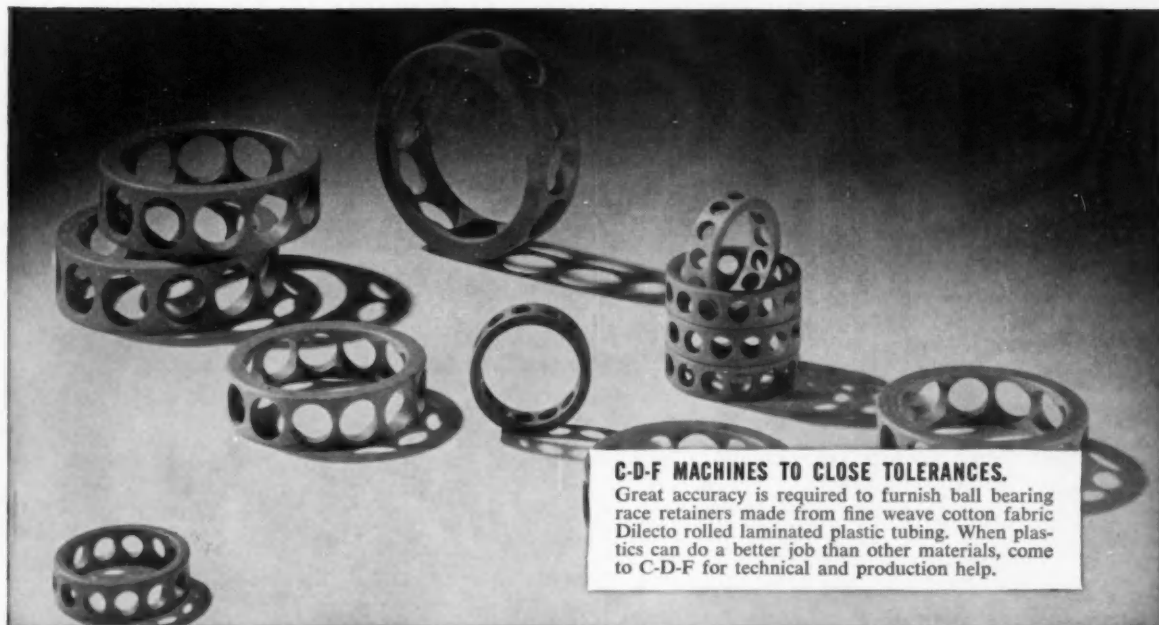
The assembly of standard control components into Pan-A-trol\* panels means added dependability for your machines. Also, packaged control in a NEMA 12 enclosure makes inspection and maintenance easier, and helps protect against the entrance of oil, dirt, or moisture.

Be sure you have high quality, dependable control for the machines in your plant. To obtain more information on these G-E devices for the automotive industry, contact your nearest G-E Apparatus Sales Office or Distributor, or write Section 733-14, General Electric Company, Bloomington, Illinois, for GEA-6317, CONTROL FOR JIC APPLICATIONS.

\* Trade mark, General Electric Company

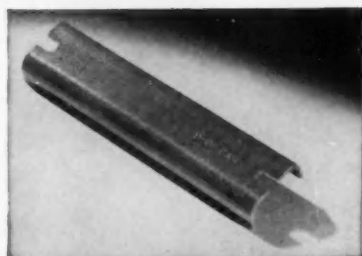
*Progress Is Our Most Important Product*

**GENERAL  ELECTRIC**

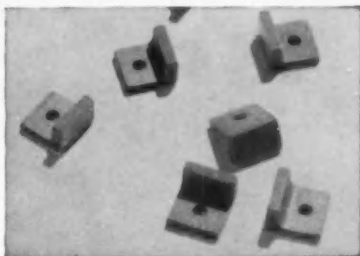


#### C-D-F MACHINES TO CLOSE TOLERANCES.

Great accuracy is required to furnish ball bearing race retainers made from fine weave cotton fabric Dilecto rolled laminated plastic tubing. When plastics can do a better job than other materials, come to C-D-F for technical and production help.



**C-D-F PIONEERED IN POST-FORMING** of laminated plastics. This technique gives you stronger, more versatile insulating parts with lower costs. This aircraft channel strip is an example of simple post-forming.

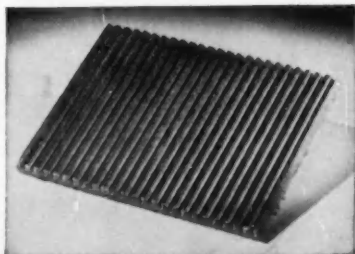


**C-D-F DOES THE UNUSUAL.** These rubbing blocks are made from fine-weave cotton cloth Dilecto molded tubing that has been pierced and cut. The part gains in mechanical strength — the product gets longer service life.

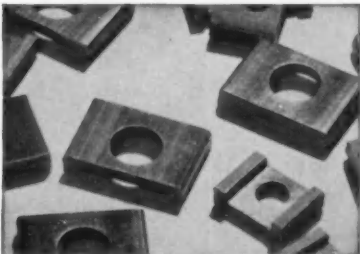


**C-D-F SPECIALIZES IN AUTOMATIC SCREW MACHINING** of plastic components. These breaker arm bushings are made from Dilecto paper base rolled tubing on high speed machines by men who know and use cost saving methods.

**Yes, C-D-F is a big reliable source for fabricated plastics!**



**C-D-F SERVES MANY INDUSTRIES** with fabricated specialties. A great amount is concentrated in the automotive and allied fields. This aircraft part has a corrugated surface on a strong woven asbestos laminated base.



**C-D-F IS A PUNCHING SPECIALIST** on these starter solenoid insulators. This is XX-26 Dilecto molded channel strip, pierced and punched to length. Special C-D-F punching grades give you lower costs, faster assembly, fewer rejects.



**C-D-F COMES UP WITH THE ANSWERS** to insulating problems. These unique snap-in grommets are easy to insert, spring out and hold tight. Write for samples. The chances are that C-D-F is already making the answer to your problem.

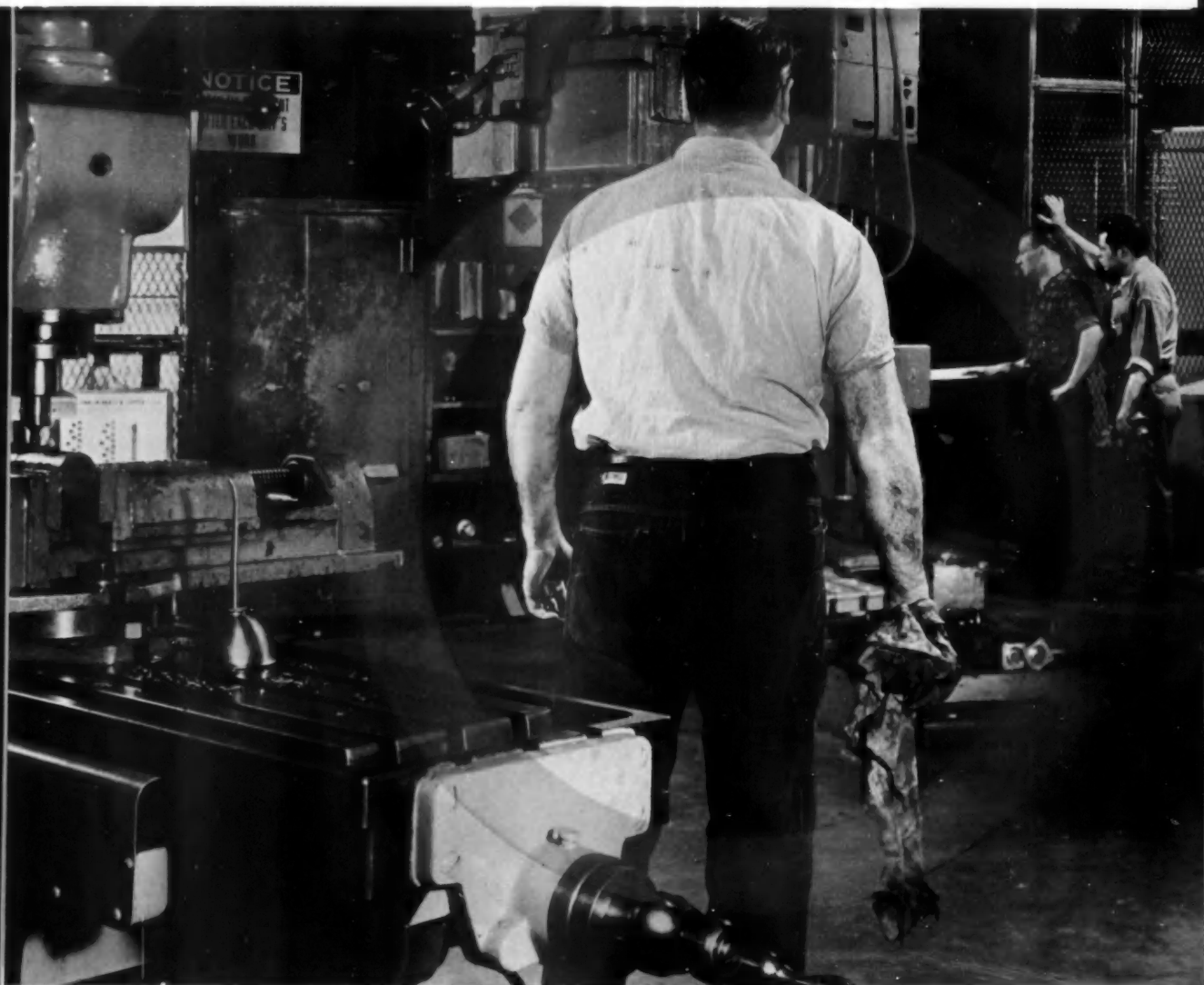
See our general catalog in Sweet's Design File for more technical data, the address and telephone number of your nearest C-D-F sales engineer. Also, write for detailed information, samples, or send us your print for quotation.



**CONTINENTAL DIAMOND FIBRE**

CONTINENTAL-DIAMOND FIBRE DIVISION OF THE BUDD COMPANY, INC.

NEWARK 2, DELAWARE



To get clean wipers at the tool crib, this lathe operator must make the hike, then stand in line. Dirty wipers in hand, he makes the trip at least once a day, takes several minutes to do it.

## He has to waste 60 minutes a week



In two sizes

Easy to distribute



Really soak up oil . . .



Always a clean one handy . . .



Just toss 'em in the trash . . .



With a carton of 125 clean Scott Wipers at every workbench, daily wiper replacement is often unnecessary. One carton can last for days and a man has a fresh supply right at his fingertips.

## ... He stays on the job The difference is... Scott Wipers

Check your production line. See how much time the men are forced to waste in order to keep supplied with fresh wiping material.

It adds up to more lost production time than you might think.

Scott Wipers are disposable. A man picks up a carton when he checks in... keeps it with him all day long. He uses one Wiper thoroughly—throws it away. Compli-

cated distribution is ended. So is sorting, baling, and laundering.

And with fresh Scott Wipers there's no danger of hidden chips damaging men or metal.

Your local Scott representative or distributor will demonstrate the Scott Wiper in your plant. Call him or mail this coupon today.

*Another quality product of...*

**SCOTT PAPER COMPANY**

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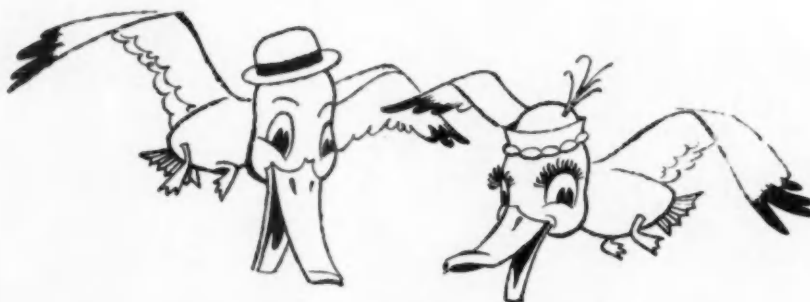
Please send me more  
information about  
Scott Wipers.

Name

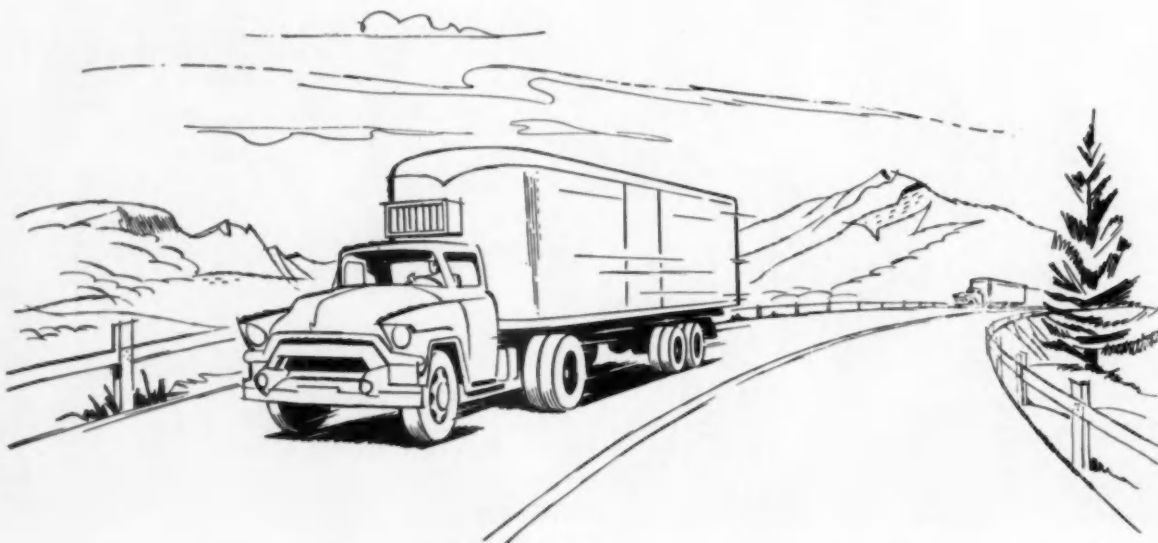
Company

Position

Address



They are also birds of a feather  
...all have **SKF**® bearings



By flocking to a single source where all basic types of bearings are available, many in the automotive industry are fast becoming "birds of a feather."

They share a common knowledge that **SKF**'s complete line provides a bearing with *plus values* for every application.

Why not profit by their experience, and wing your way towards **SKF**, today.

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**SKF**

EVERY TYPE—EVERY USE

Ball Bearings  
Cylindrical Roller Bearings  
Spherical Roller Bearings  
Tapered Roller Bearings ("Tyson")

\*Reg. U.S. Pat. Off. Tyson Bearing Corporation

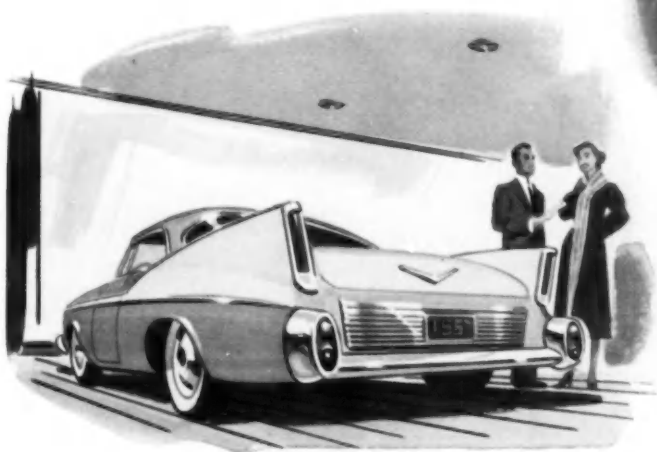
**SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.**

# in automobiles everybody benefits from Stainless Steel

**THE MANUFACTURER** styles your car with Stainless Steel because it's the readily workable, long lasting metal with beauty and sales appeal.



**THE DEALER** is proud and confident to offer a product made with Stainless Steel. He knows that nothing compares with Stainless for durability and customer satisfaction.



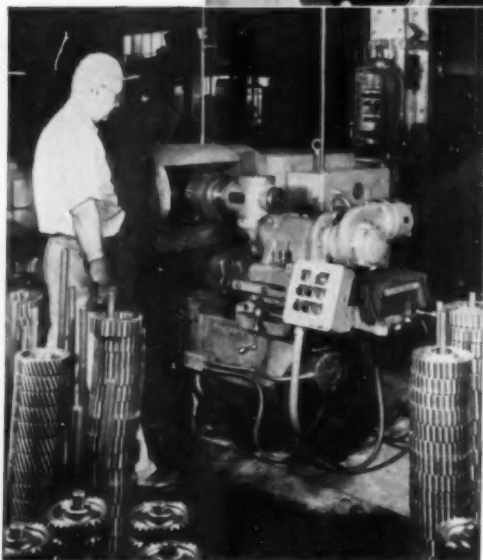
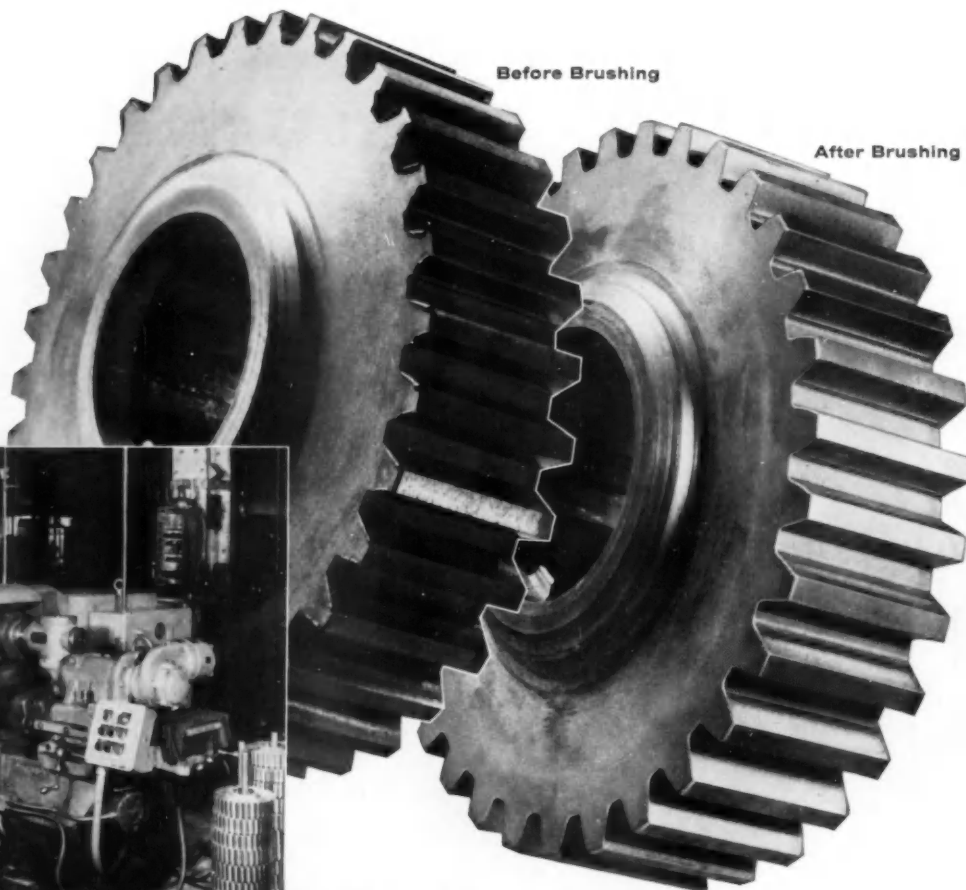
**THE PURCHASER** from long experience recognizes Stainless Steel as the easy to clean metal that keeps its shape and good looks under the toughest conditions of driving and weather. Also it's a big plus at trade-in time.

## Mc LOUTH STAINLESS STEEL

FOR THE PRODUCT YOU MAKE TODAY AND THE PRODUCT YOU PLAN FOR  
TOMORROW SPECIFY McLOUTH HIGH QUALITY SHEET AND STRIP STAINLESS STEEL



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*A leading machine company, supplying gears for mining and a variety of other heavy machinery, uses Osborn's Brushmatic 4 and a brushing cycle of 6 seconds a side to finish these gears in lots of 20 and up.*

## Pays Off... 25 for 1

**R**EMOVING burrs from the teeth and internal spline of this gear was once a 5 minute, hand filing operation. Using Osborn Brushmatic® methods, only 12 seconds are required to remove these burrs. In addition, power brushing blends all surface junctures, reducing fracture-causing concentrations of stress.

An **Osborn Brushing Analysis**, made in your plant and at no obligation, will show how *you* can improve quality while making similar savings in finishing time and cost. Write *The Osborn Manufacturing Company, Dept. E-46, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES  
BRUSHING MACHINES • FOUNDRY MOLDING MACHINES

Osborn Brushes 

## BUSINESS PULSE

(Continued from page 98)

situation of determining *how many* investment plans have been rendered of questionable profitability by a particular increase in the interest rate. In the present instance, have many plans been affected? Or only a few? This is a matter of trying to judge how many investment plans are "marginal" at any given time, which is strictly in the realm of conjecture.

The issue is further complicated by the fact that many economists do not accept the characterization of the businessman as a highly rational figure who makes investment decisions on the basis of a neat, precise comparison of the expected rate of profit on the one hand and the interest cost on the other. Instead, they believe that businessmen will frequently go ahead with an investment decision that is of questionable profitability in the hope that conditions affecting its profitability will improve in the future. This, in effect, reflects a belief that businessmen tend to err on the side of optimism. Moreover, some economists argue that much investment is undertaken not because a careful calculation of expected profitability points in that direction but rather out of necessity to modernize and grow in order to keep up with or ahead of the competition. If "irrational" considerations of this sort are in fact important, one is especially at a loss to judge the probable impact of changes in interest rates, because investment decisions will not be closely correlated with them.

Thus, although there is reason to believe today that some businesses or firms are deferring or trimming investment plans because of either higher interest rates or the lack of availability of credit, or both, there is no way to judge the extent of such retrenchment with assurance. The consensus seems to be that the squeeze has not been of great significance as yet and that for the most part demands for credit to meet soundly conceived business plans are still being largely met. This represents at best an informed opinion, however, and will have to remain tentative until sufficient time has passed to provide a statistical record.

### Inflationary Pressures

It should be recognized that negative repercussions on investment from tight money and higher interest rates would not necessarily be an unfavor-

## **B** NYLOK'S® SEAL *as they LOCK*



**B NYLOK® FASTENERS** stop weeping bolts, dripping oil pans, gasoline, alcohol, and air leaks. Won't vibrate loose, shrink, dry, or turn brittle. Unaffected by age, or sustained temperatures up to 250°F.

**B NYLOK'S®** are easy to take-up or back-off. Stay locked at ANY depth... need not be fully seated. Give smooth torque with no damage to threads or seating surfaces.

**THE SECRET**... a permanent insert of tough, resilient nylon with positive **LOCKING** and **SEALING** properties easily adapted to any **B** threaded fastener.

**ELIMINATES** costly locking devices and double inventory. Saves handling and assembly time.

● **WRITE** for our NEW brochure. Call **B** for quotes.

### BUFFALO BOLT CO.

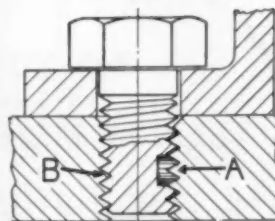
Division of Buffalo-Eclipse Corporation  
NORTH TONAWANDA, N. Y.

#### 3 convenient service centers

<b>WESTERN OFFICE</b> Chicago Harrison 7-2179	<b>EASTERN OFFICE</b> New York City RECTOR 2-1888	<b>CENTRAL OFFICE</b> North Tonawanda JACKSON 2400 (Buffalo)
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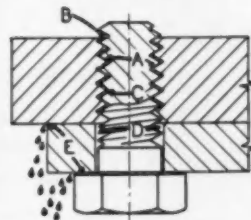
**SELF-LOCKING** **B** **NYLOK®**  
**SELF-SEALING** **FASTENERS**

### HOW NYLOK WORKS



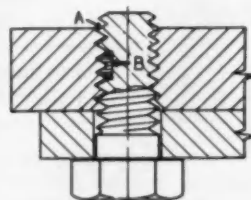
● Resilient nylon pellet (A) sets up lateral thrust which wedges mating threads smoothly together (B). All locking action is on the threads. Tight, metal-to-metal union... positive, leak-proof lock.

### HOW NYLOK SEALS



STANDARD BOLT

● Axial force causes load-bearing faces to meet tightly at (A). Fluid is prevented from following helical path down to flange, or bolt head. Nothing, however, prevents fluid entering above non-load-bearing faces (B) from following helical path (C) to clearance hole (D) and seeping out at (E).



NYLOK BOLT

● With NYLOK® seal, both load and non-load-bearing faces meet in tight metal-to-metal union. Fluid entering at (A) flows only as far as NYLOK pellet (B) which provides effective dam to further flow... puts an end to leakage.

## DO YOU NEED BETTER METAL CLEANERS FOR THESE JOBS?

**This 48-page illustrated booklet  
tells how to cut cleaning costs  
in aircraft production.**



<b>1</b>	<b>How to clean aluminum before anodizing.</b> See pages 4 to 8.
<b>2</b>	<b>How to prepare aluminum for welding.</b> See pages 10 to 14.
<b>3</b>	<b>How to prepare aluminum for painting.</b> See pages 15 to 19.
<b>4</b>	<b>How to clean aluminum before and after heat treating.</b> See page 20.
<b>5</b>	<b>How to strip paint from aluminum.</b> See pages 22 to 26.
<b>6</b>	<b>How to clean magnesium.</b> See pages 27 to 29.
<b>7</b>	<b>How to install cleaning tanks and spray-washing machines.</b> See pages 31 to 35.
<b>8</b>	<b>How to control overspray in paint booths.</b> See pages 36 to 37.
<b>9</b>	<b>How to clean engine test cells.</b> See page 40.

**FREE** Write for your copy of the booklet.

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Principal Cities of U. S. and Canada  
Export Division Cable Address: Oakite

**OAKITE PRODUCTS, INC.**  
28A Rector St., New York 6, N. Y.

Send me a FREE copy of "How to clean metals in aircraft production"  
I am especially interested in the jobs indicated by the numbers I have  
circled below:

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COMPANY \_\_\_\_\_

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able development from the long-range viewpoint. The fact is that one of the chief purposes of the Federal Reserve's tight money policy is to insure against the sort of speculative, run-away investment that has brought about subsequent crises so many times in the past. There has clearly been a tendency for investment to run ahead of real savings, and to the extent that monetary policy proves successful in restoring a balance, the chances improve that high-level, sound prosperity will be extended into the future. The danger exists, of course, that restrictive trends, once started, could not be easily reversed, since monetary management is still far from being a perfected art, but for the time being this is no more than a possibility, and no evidence has yet come to light to make it a source of active concern.

### Cost-Price Squeeze

The inflationary pressures which are still in evidence in the economy remain a vexing problem. It does seem reasonable to suppose that the Federal Reserve's tight-money policy will prove effective in preventing runaway inflation. But actually there was probably never much danger that runaway inflation would develop anyway, since the classic requisite for such a development—a lavish, superabundant supply of money—was never present. This is no assurance, however, that price pressures will not be a troublesome business problem—one that could undermine prosperity—in the next year or so. For even if credit policy proves successful in keeping price averages stable, many would argue that such an achievement would constitute only a suppression of the symptoms of the problem and would leave the underlying causal factors, which give rise to the price pressures, untouched. A chief cause of these price pressures has been the tendency for wage increases in the large unionized industries to run ahead of productivity gains. So long as this continues there will be a compelling pressure for the higher prices, so that profit margins can be maintained. If monetary policy creates market conditions which thwart actual price advances, the objective of a stable price level will have been achieved at the expense of deteriorating profit positions.

Statistics indicate that just such a "cost-price" squeeze has been in progress this year, and the presumption is that it is currently being extended. Should this continue, it could hardly

# *Announcing!*

## **"GRADE MARK SERVICE"**

**a new time-and-money-saving "extra"  
to users of COLD FINISHED BARS**



● "GRADE MARK SERVICE" gives you quick, accurate identification.

● With strapping seal showing grade of each bundle, you save time and trouble in identifying and handling each grade. This is "Grade Mark Service." No need to separate and sort out bars—they are bundled according to grade.

● Another reason why U. S. STEEL SUPPLY is where to buy!

To simplify the identification and handling of cold finished bars . . . to make it much easier for your receiving department to properly stock incoming shipments, we have an entirely new method of bundling and marking the bars you order.

Beginning now, the cold finished bars in your order will be shipped to

you in neatly strapped bundles, and each bundle will carry a seal which clearly shows the grade of the bars in that particular bundle. Thus, without altering your stocking procedure in any way, you save time and trouble in identifying and handling each grade. This is "Grade Mark Service."

This new and improved method of bundling and marking shipments of cold finished bars is another reason why it pays to buy from U. S. STEEL SUPPLY. One call is all that's needed to get the bars you want. Your order will be filled and shipments made from the warehouse nearest the point of delivery.

# **U. S. STEEL SUPPLY**

**DIVISION**

General Offices: 208 So. La Salle St., Chicago 4, Ill.



Warehouses and Sales Offices Coast to Coast

**UNITED STATES STEEL**

be productive of buoyant business attitudes, and could very well bring the process of expansion to a halt and generate recessive tendencies. This is

by no means an academic consideration but, on the contrary, could, in the opinion of many analysts, become a real problem next year.

## More Government Contract Awards

**T**HIS latest list of Government prime contracts that have been awarded covers the period from August 28 to September 27, 1956. Items included in this list are for various

types of automotive military equipment, including tanks, motorized gun carriages, trucks, airplanes, automotive components and spare parts, automotive maintenance equipment, etc.

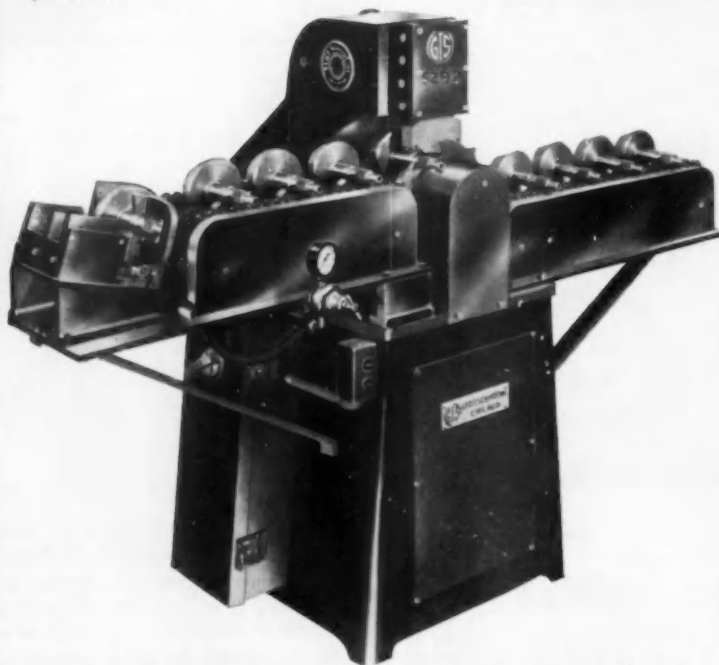
## PINION GEAR MARKING?



Model 395

This fully automatic GTS unit marks code numbers on pinion gears—uniformly and accurately—at a production rate of 900 per minute.

**DOES IT  
ECONOMICALLY  
... AUTOMATICALLY**



The gears are fed to the spider by means of a chain feed, which carries them under a concave lettering tool. A pneumatic cushion is provided in the die holder to accommodate variations in diameter, insuring uniform depth of marking within both high and low tolerance limits.

**FOR FURTHER INFORMATION** about this model, or for expert engineering assistance with any industrial marking problem, see your nearest GTS representative, or write direct.

**IF IT'S WORTH MAKING,  
IT'S WORTH MARKING.**

**GEO. T. SCHMIDT, INC.**

4110 Ravenswood Avenue Chicago 13, Illinois

**ACF INDUSTRIES, INC.,** Carter Carburetor Div., St. Louis, Mo.  
Carburetor assy.—5824—\$112,435

**BAY CITY SHOVELS, INC.,** Bay City, Mich.  
Crane shovel, truck mounted, 6 x 6, size 20 ton, 2 engine drive—14 ea.—\$546,182

**BENDIX AVIATION CORP.,** Bendix Products Div., South Bend, Ind.  
Motor vehicle parts—1250 ea.—\$28,562

**BENDIX AVIATION CORP.,** Scintilla Div., Sidney, N. Y.  
Parts to support ignition units—various—\$29,969

**BENDIX AVIATION CORP.,** Utica Div., Utica, N. Y.  
Spare parts for combat vehicles—3648 ea.—\$70,406  
Starter generator—638 ea.—\$828,762

**BORG-WARNER CORP.,** Mech. Universal Joint Div., Rockford, Ill.  
Shaft assy. propeller—1445—\$67,973

**BORG-WARNER CORP.,** Pesco Products Div., Bedford, Ohio  
Maintenance parts—various—\$183,930

**CLARK EQUIPMENT CO.,** Battle Creek, Mich.  
Truck, forklift, gasoline, 4000 lb capacity—28 ea.—\$93,222  
Trucks, forklift, gasoline, 15,000 lb capacity—241 ea.—\$1,777,669

**CURTISS - WRIGHT CORP.,** Propeller Div., Caldwell, N. J.  
Repair and/or modification propeller assemblies—\$2,115,000  
Spare parts for various propeller assemblies—\$297,010  
Repair, testing, propeller assemblies—\$137,000  
Spare parts for propellers—\$26,638

**CURTISS-WRIGHT CORP.,** Wright Aeronautical Div., Wood-Ridge, N. J.  
Overhaul of J-65 aircraft engines—job—\$1,680,000

**DIAMOND T MOTOR CAR CO.,** Chicago, Ill.  
Rod, assy., steering tie—1377—\$46,846

**DOUGLAS AIRCRAFT CO., INC.,** Santa Monica, Calif.  
Stack assemblies—various—\$52,900  
Parts for R5D spares—various—\$77,323  
Parts for R6D A/C—various—\$25,623

**THE ELECTRIC AUTO-LITE CO.,** Toledo, Ohio  
Motor vehicle parts—51,020 ea.—\$32,272  
Batteries—2170 ea.—\$26,769

**ELECTRIC STORAGE BATTERY CO.,** Willard Storage Battery Div., Cleveland, Ohio  
Batteries—\$386,010

**FAIRCHILD ENGINE AND AIRPLANE CORP.,** Fairchild Engine Div., Long Island, N. Y.  
J-44-R-20 engines—92—\$1,647,559

**FAIRCHILD ENGINE AND AIRPLANE CORP.,** Stratos Div., Bay Shore, N. Y.  
Turbine assys.—various—\$397,532

**FARGO MOTOR CORP.,** Washington, D. C.  
Light trucks—\$4—\$128,129

**FIRESTONE INDUSTRIAL PRODUCTS CO.,** Firestone Tire and Rubber Co., Akron, Ohio  
Track 8-shoe section, T-110—324 ea.—\$71,026

**FORD MOTOR CO.,** Ford Div., Washington, D. C.  
Trucks—14—\$34,961

**THE GARRETT CORP.,** AirResearch Manufacturing Co. of Ariz. Div., Phoenix, Ariz.  
Compressor-air gas turbine driven, trailer mounted—300 ea.—\$5,475,519  
Spare parts—\$1,642,655  
Special tools and test equipment—\$273,775  
Compressor air, gas turbine driven, Type MA-1A—66 ea.—\$1,082,042  
Compressor-air—376 ea.—\$6,164,356  
(Turn to page 122, please)



**FOR 1957!**

Rochester develops  
outstanding new performance  
for all GM cars!

This year, Rochester sets the pace in the performance race . . . with the most advanced fueling systems on the road. Years-ahead design and engineering research provide GM's "famous five" with precision fuel control that will help set new highs in performance and economy.

First engineered for the high-compression era, Rochester fueling systems are now ready to establish even higher performance records. Quality-built for rugged duty and responsive action, Rochester systems are dependable, durable, and specially designed for the world's finest engines. That's why you find Rochester standard equipment on the 1957 Cadillac, Buick, Oldsmobile, Pontiac and Chevrolet.

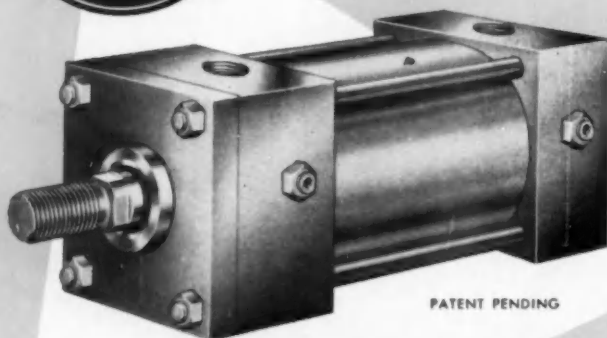


Rochester Products Division of General Motors Corp., Rochester, N. Y.

# FOR AUTOMATION



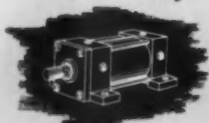
# CYLINDERS



PATENT PENDING

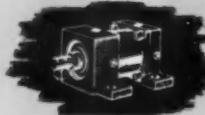
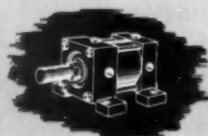
## top performance—longest life

All S-P cylinders are engineered throughout for high speed, efficient operation. Piston rods are heat treated and hard chrome plated to resist scoring. Bronze cartridges with extra long bearing surfaces are easily removable for quick servicing of rod seals and wipers. End plates are rolled steel. All S-P cylinders are built to JIC standards.



**S-P STANDARD AIR CYLINDERS** have brass tubes to eliminate corrosion. Cushions float on O-rings for maximum cushioning. Eleven bore sizes, 1½" — 14". 21 mounting types. Readily modified for oil or water. Send for Catalog No. 110.

**S-P HEAVY DUTY AIR CYLINDERS** for automation and other severe applications. Double porting for extreme high speeds. Heavy wall seamless steel tube. Nine bore sizes, 1½" — 8". Five mounting types. Approved and used by two major automobile manufacturers. Send for Catalog No. 109-A.



**S-P HIGH PRESSURE HYDRAULIC CYLINDERS** have seamless steel tube. Special locking mechanism eliminates tie rods. Designed for 2,000 psi. Eleven models in 11 sizes. Send for Catalog No. 104.

Step up production with S-P cylinders. Representatives in principal cities. Prompt deliveries. Order catalog by number shown above. The S-P Manufacturing Corporation, 30201 Aurora Rd., Solon, Ohio. In greater Cleveland.



Specify **SP**

**THE S-P MANUFACTURING CORP.**

SOLON, OHIO • IN GREATER CLEVELAND

ESTABLISHED 1916

A BASSETT COMPANY

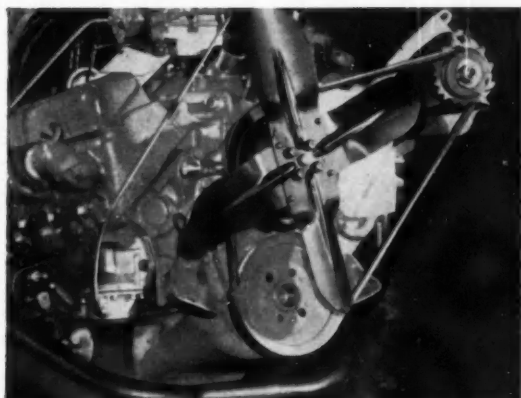
NON ROTATING AIR AND HYDRAULIC CYLINDERS • ROTATING AIR AND HYDRAULIC CYLINDERS  
POWER CHUCKS • COLLET AND DRILL PRESS CHUCKS • AIR PISTONS, VALVES, ACCESSORIES

(Continued from page 120)

Funds committed and reserved—\$2,103,960  
Spare gas turbine compressor unit—8 ea.—\$1,266,366  
Spare parts—\$365,443  
Engineering data—\$10,000  
Technical data—\$50,000  
Special tools and test equipment—\$565,760  
Engineering change item—\$347,500  
Total Contract Value—\$14,048,294  
**THE GARRETT CORP., AirResearch Manufacturing Co. Div., Los Angeles, Calif.**  
Overhaul modification turbine driven accessories—job—\$185,642  
**GENERAL DYNAMICS CORP., Convair Div., San Diego, Calif.**  
Modification of C-131B type aircraft—\$679,486  
**GENERAL ELECTRIC CO., Ontario, Calif.**  
Overhaul, modification of turbo superchargers—job—\$658,987  
**GENERAL ELECTRIC COMPANY, Evendale, Ohio**  
Overhaul of YJ/J79-GE-1/3 turbo-jet engines—job—\$623,055  
**GENERAL MOTORS CORP., AC Spark Plug Div., Flint, Mich.**  
Automotive spare parts—17,892 ea.—\$43,476  
Repair and modification of A-1A BNC components—\$9,849,784  
**GENERAL MOTORS CORP., Aeroproducts Operation Div., Dayton, Ohio**  
Spare parts for propellers—\$1,120,788  
**GENERAL MOTORS CORP., Allison Div., Indianapolis, Ind.**  
Overhaul of T56-A-1-A1A and YT56-A-3 turbo prop engines—Job—\$1,171,750  
Overhaul and modification of parts of T56 aircraft engine—Job—\$458,000  
Cover, left end Assy.—21 ea.—\$58,204  
**GENERAL MOTORS CORP., Chevrolet Motor Div., Detroit, Mich.**  
Light trucks—120 ea.—\$172,229  
**GENERAL MOTORS CORP., GMC Truck & Coach Div., Oakland, Calif.**  
Vehicle parts—3700 ea.—\$38,331  
**THE B. F. GOODRICH CO., Akron, Ohio**  
Aircraft boots—various—\$1,172,807  
**B. F. GOODRICH TIRE & EQUIPMENT CO., Div. of B. F. Goodrich Co., Akron, Ohio**  
Delcer boots—various—\$225,686  
Wheel assemblies—31 ea.—\$35,020  
Wheel and brake assemblies—various—\$39,562  
**GRUMMAN AIRCRAFT ENGINEERING CORP., Bethpage, L. I., N. Y.**  
Hinge, duct, bell Assy.—various—\$88,621  
**HARNISCHFEGGER CORP., Milwaukee, Wis.**  
Crane, crawler, full revolving, 1½ cu yd capacity, Diesel engine driven—2 ea.—\$112,099  
**THE FRANK G. HOUGH CO., Libertyville, Ill.**  
Tractor, Diesel—50 ea.—\$348,046  
**HOWARD INDUSTRIES, Cyclehm Motors, Racine, Wis.**  
Tank spare parts—349—\$220,378  
**HUGHES AIRCRAFT CO., Culver City, Calif.**  
Modification kits and spare parts for E-4 FCS—\$1,340,717  
Spare parts for fire control systems—\$264,240  
**INTERNATIONAL HARVESTER CO., Washington, D. C.**  
Trucks—47—\$94,396  
**INTERNATIONAL HARVESTER CO., Chicago, Ill.**  
Five-ton, 6 x 6 trucks—1644—\$17,328,611  
(Turn to page 124, please)



**RADIATOR HOSE** takes higher pressures, resists stretching far better when reinforced with strong-as-steel Fortisan-36.



**V-BELTS** with Fortisan-36 present no problem of stretching or contracting under atmospheric changes or "work." Makes it easy to match belts.



**HYDRAULIC HOSE** reinforced with Fortisan-36 are lighter but stronger for reliable power transmission. Retains dimensional stability under heat.

## For extra strength and low stretch... Fortisan-36 Rayon

Radiator hose, V-belts and hydraulic hose stand up to the toughest operating conditions when they're made with Fortisan-36 rayon fiber. This remarkable new Celanese development is fast becoming a leading contender for the heavy-duty title.

Fortisan-36 is a high-tenacity rayon of saponified acetate that combines unprecedented strength with minimum elongation and near-perfect dimensional stability. It's the easiest way to make a product stronger for the same weight . . . or lighter for the same strength. Write for the complete story on sensational new Fortisan-36 (ask for booklet TD 20A) to Celanese Corporation of America, Industrial Sales Dept., Textile Division, Charlotte, N. C. *Branch offices:* 180 Madison Ave., N. Y. 16; 22 W. Madison St., Chicago 2, Illinois.

Celanese®

# Celanese

## Fibers for Industry

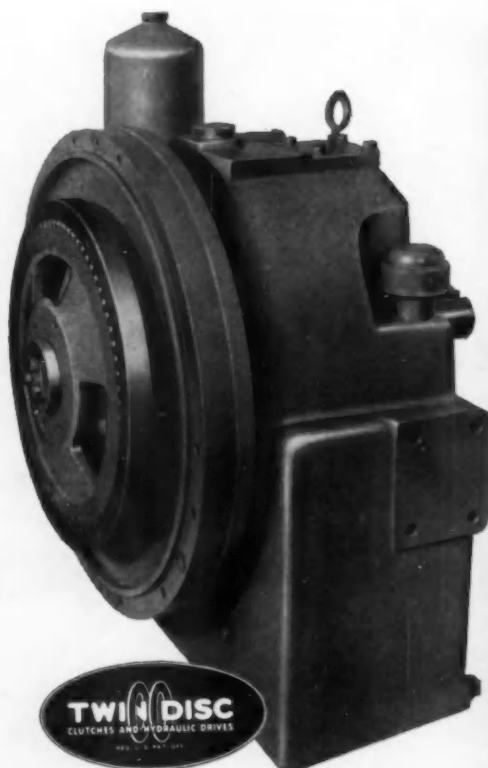
ARNEL® TRIACETATE

FORTISAN® RAYON

FORTISAN®-36 RAYON

ACETATE

VISCOSE-RAYON



## announces new **SINGLE-STAGE** **Torque Converters**

Here's another good answer to the power transmission problems involved in today's heavy-duty machinery—the all new Twin Disc Single-Stage Torque Converter.

The new single-stage torque converter is currently available in the 1500 Series, which is applicable to engines producing from 30 hp at 1150 rpm to 207 hp at 2500 rpm. Four models provide various input and output combinations.

Already time-proved by extensive field tests, this single-stage torque converter is ideal for use in shovels, hoists, draglines, front-end loaders . . . in all types of construction, mining, logging and oil field equipment requiring smooth, efficient, dependable torque multiplication.

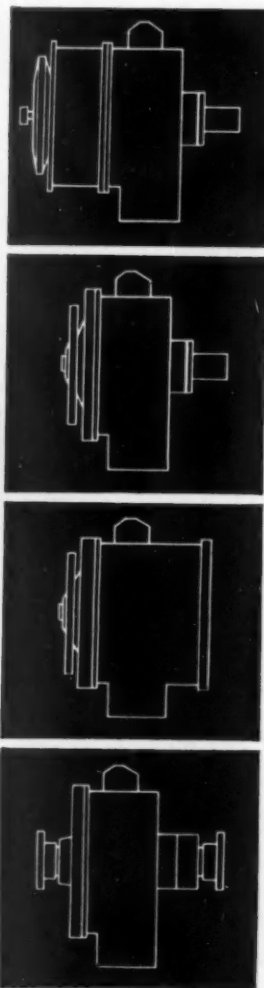
This new Twin Disc Torque Converter will cut operating costs . . .

boost profits . . . handle the toughest jobs with ease. The converter's smooth flow of power eliminates sudden load shocks between engine and driven equipment . . . cushions out harmful vibrations.

In designing new models, or modifying existing ones, consult Twin Disc for unbiased recommendations on either new single-stage or long-established three-stage torque converters.



**TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois**  
Branches or Sales Engineering Offices: Cleveland • Dallas • Detroit • Los Angeles • Newark • New Orleans • Tulsa



(Continued from page 122)

- GLENN L. MARTIN CO.,** Baltimore, Md.  
Repair and modification of aircraft components—\$300,000  
Modification kits, spare parts—\$55,523
- MODINE MANUFACTURING CO.,** Racine, Wis.  
Radiator assy.—1188—\$104,829
- MCDONNELL AIRCRAFT CORP.,** St. Louis, Mo.  
Panel, canopy and nozzle assemblies—various—\$329,646
- NEW PROCESS GEAR CORP.,** Syracuse, N. Y.  
Spare parts for combat vehicles—693 ea.—\$90,832
- NORTH AMERICAN AVIATION, INC.,** Los Angeles, Calif.  
Installation of electronic equipment and IRAN of F-86D type aircraft—355 ea.—\$3,500,000
- OSHKOSH MOTOR TRUCK, INC.,** Oshkosh, Wis.  
Snowplow, truck mounted—43 ea.—\$1,346,717
- ROSS GEAR AND TOOL CO.,** Lafayette, Ind.  
Gear, steering—308 ea.—\$64,363
- SOUTHWEST TRUCK BODY CO., INC.,** St. Louis, Mo.  
Truck, van type, for reproduction equipment—165 ea.—\$1,343,410
- STEWART-WARNER CORP.,** Chicago, Ill.  
Motor vehicle parts—51,020 ea.—\$49,846
- THOMPSON PRODUCTS, INC.,** Cleveland, Ohio  
Overhaul and modification of turbine fuel pumps—job—\$64,266
- UNITED AIRCRAFT CORP.,** Hamilton Standard Div., Windsor Locks, Conn.  
Servicing of propeller blade assys.—400 ea.—\$279,956
- UNITED AIRCRAFT CORP.,** Sikorsky Aircraft Div., Bridgeport, Conn.  
HSS-1 helicopters (53)—177—\$33,451,761  
HUS-1 helicopters (124)  
HR2S-1 helicopters—21—\$15,182,435
- WILLYS MOTORS, INC.,** Toledo, Ohio  
Trucks—153—\$252,770

## BOOKS . . .

**ROCKET PROPULSION ELEMENTS,** by George P. Sutton, published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. Price, \$10.25. The second edition of this book has been revised to include a broader treatment of the basic elements and technical problems of rocket propulsion, as well as a more comprehensive discussion of the physical mechanisms, applications, and designs of rocket propulsion systems. The contents are divided into three main categories. The first category consists of several chapters concerned exclusively with liquid propellant rockets, their working fluids and design. Another category includes chapters on solid propellant rockets, their working substances and design. The third category deals with general principles of thermodynamics, chemistry, heat transfer, flight theory, and testing methods as they apply to both liquid and solid propellant rockets. The book is plentifully supplied with tables and curves, and is profusely illustrated with photographs and drawings. It also includes a new bibliography, which lists approximately 600 references to pertinent publications in the technical literature.

# more dependable starting *under all operating conditions*

**"No Kick-Out" feature sets new standards  
in starting performance.**

• Since the earliest days of the automotive industry Bendix\* Starter Drives have been noted for reliable starting.

Now with the new and latest Bendix Folo-Thru Starter Drive, starting, even under the most adverse weather conditions, has been improved immeasurably.

Although this new Bendix Starter Drive is fundamentally similar to its illustrious predecessors, it is specially designed to follow through the weak explosions until the engine actually runs on its own power.

That's why cars, trucks and buses equipped with the Bendix Folo-Thru Drive are easier and quicker to start under all operating conditions.

\*REG. U.S. PAT. OFF.

**ECLIPSE MACHINE DIVISION OF**

**ELMIRA, NEW YORK**

Export Sales: Bendix International Division,  
305 East 42nd St., New York 17, N. Y.



# Bendix

# folo-thru

# starter drive



**costs less** —The new Folo-Thru Drive requires no actuating linkage and the less expensive solenoid may be placed in any convenient position. Results are lower installation costs and no adjustments. Complete detailed information is available on request.

Bendix\* Folo-Thru Starter Drive



Bendix\* Automotive Electric Fuel Pump



Stromberg\* Carburetor



# Caterpillar protects the



Snaking giant logs through a forest near Washington, Calif., a Caterpillar D-8 Crawler Tractor demonstrates its world-famous durability. To insure dependable performance, Caterpillar uses Bundyweld Tubing for vital oil and hydraulic lifelines.

## BUNDYWELD IS DOUBLE-WALLED FROM A SINGLE STRIP



Bundyweld starts as a single strip of copper-coated steel. Then it's . . .



continuously rolled twice around laterally into a tube of uniform thickness, and



passed through a furnace. Copper coating fuses with steel. Result . . .



Bundyweld, double-walled and brazed through 360° of wall contact.

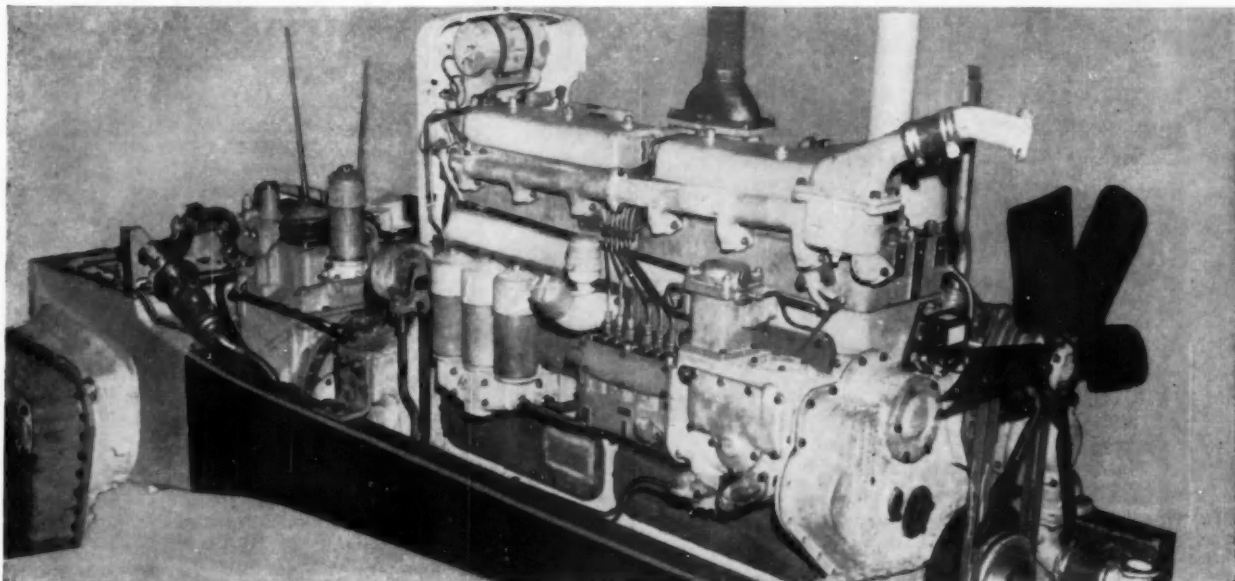


SIZES UP  
TO 1/8" O.D.

NOTE the exclusive Bundy-developed beveled edges, which afford a smoother joint, absence of bead, and less chance for any leakage.

# reputation of its tractors with lifelines of Bundyweld Tubing

... the extra-sturdy steel tubing that's double-walled from a single metal strip and copper-bonded through 360° of wall contact



Caterpillar diesel engine, showing Bundyweld oil and hydraulic lines in copper color.

**I**F PAUL BUNYAN'S famous blue ox, Babe, were still around today, she'd find mighty tough competition from logging machinery like the Caterpillar D-8 Tractor shown here.

For powerful Caterpillar Tractors are built to take punishment year after year, and still give top performance. Every component part of these diesel-engined beauties must combine strength and durability. That's why you'll find Cat machinery equipped with oil and hydraulic lifelines of Bundyweld Steel Tubing.

Bundyweld Tubing is thinner-walled, yet

stronger; leakproof by test. It can withstand heavy vibration fatigue, take punishing wear that would ruin ordinary tubing. And only Bundyweld Steel Tubing is double-walled from a single metal strip, copper-bonded through 360° of double-walled contact.

Your product will benefit from Bundyweld's high quality. And you can benefit from these special Bundy® services: world's finest tubing-fabrication facilities; expert technical assistance; and prompt, on-schedule deliveries.

For more information, wire or write today!

**BUNDY TUBING COMPANY • DETROIT 14, MICHIGAN**

## **BUNDYWELD® TUBING**

Bundy Tubing Distributors and Representatives: Cambridge 42, Mass.: Austin-Hastings Co., Inc., 226 Binney St. • Chattanooga 2, Tenn.: Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • Chicago 32, Ill.: Lopham-Hickey Co., 3333 W. 47th Place • Elizabeth, New Jersey: A. B. Murray Co., Inc., Post Office Box 476 • Los Angeles 58, Calif.: Tubesales, 5400 Alcoa Ave. • Philadelphia 3, Penn.: Rutan & Co., 1717 Sansom St. • San Francisco 10, Calif.: Pacific Metals Co., Ltd., 3100 19th St. • Seattle 4, Wash.: Eagle Metals Co., 4755 First Ave., South • Toronto 5, Ontario, Canada: Alloy Metal Sales, Ltd., 181 Fleet St., E. • Bundyweld nickel and Monel tubing are sold by distributors of nickel and nickel alloys in principal cities.

WORLD'S LARGEST PRODUCER OF SMALL-DIAMETER TUBING • AFFILIATED PLANTS IN AUSTRALIA, ENGLAND, FRANCE, GERMANY, AND ITALY

# AIRBRIEFS

(Continued from page 96)

## Mobility by Air

In one of the recent 1956 radio broadcasts of the American Legion, Lt. Gen. James M. Gavin, Deputy Army Chief of Staff for Research & Development, and Maj. Gen. Hamilton H. Howze, Chief of the Army's Aviation Division, emphasized the need for complete mobility by air in

the age of atomic and hydrogen bombs, guided missiles and rockets. They said that air mobility is the heart and soul of success in air atomic age.

Gen. Gavin said that the problems of dispersion and mobility can best be solved by aircraft and that in this area the helicopter, flying-platforms and utility aircraft offer the greatest promise for the future. The helicopter provides a great variation in the selection of the point of thrust against the enemy. One-man flying platforms and light aircraft provide for obser-

vation and deployment. More use of aircraft by the Army will materially aid in the "survival in the air age."

## Soviet Production Rate Greater Than U. S.

In another of the recent broadcasts on the American Legion's 1956 series, Air Force Secretary Don A. Quarles stated "that while the entire free world bloc is now producing more military aircraft than the Soviet Union and its satellites, the production rate for the Soviet Air Force is larger than the production rate for the U. S. Air Force." In another statement, he said, "There is no doubt in my mind that our industry, backed up by our scientists and engineers, and operating under a free enterprise system could—and given the same directives, would—out-develop and out-produce the communist system."

## Business Aircraft Meeting

The Ninth Annual Meeting and Forum of the National Business Aircraft Association will be held October 23 to 25, 1956, at Miami, Florida. Program will include panel and forum meetings on the subjects of radar, new aircraft, air traffic control, aircraft operations, and aircraft engines. At the banquet on October 25, Captain E. V. Rickenbacker of Eastern Airlines will be presented with the NBAA Annual Meritorious award. At the luncheon on the same day, pilot safety awards will be made to the million-mile pilots and the half-million mile pilots and to aircraft companies.

## Miniature Circuit Breaker

A new aviation type of electrical circuit breaker weighing only 1.5 oz has been developed by Mechanical Products, Inc., of Jackson, Mich. The new circuit breaker was developed especially for the latest jet-type military aircraft and transport airliners that are now under construction.

Miniaturization of aircraft equipment is important because of the saving in space and weight. Many circuit breakers are used in a plane's electrical system and considerable weight is saved by use of the new circuit breaker. Tests have indicated it will perform as reliably and accurately as the heavier circuit breakers.

## New Research and Development Division

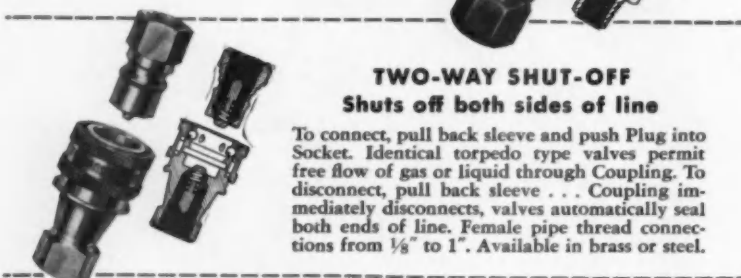
Greer Hydraulics, Inc., of Jamaica, New York, has recently established a

**SPECIFICALLY ENGINEERED ... NEVER MERELY ADAPTED ...  
FOR EACH PARTICULAR TYPE OF APPLICATION**



### ONE-WAY SHUT-OFF Shuts off one side of line

Gives quick connection and disconnection, with instant automatic flow or shut-off. To connect Coupling, and open line to flow of fluid, merely push Plug into Socket. To disconnect, a slight pull on sleeve releases Plug and shuts off supply end of line.



### TWO-WAY SHUT-OFF Shuts off both sides of line

To connect, pull back sleeve and push Plug into Socket. Identical torpedo type valves permit free flow of gas or liquid through Coupling. To disconnect, pull back sleeve . . . Coupling immediately disconnects, valves automatically seal both ends of line. Female pipe thread connections from 1/8" to 1". Available in brass or steel.

### STRAIGHT-THROUGH COUPLING

Provides quick connection and disconnection, but does not have shut-off feature. Sizes, ranging from 1/4" to 2 1/2", carried in stock. Two special types of straight-through steam Couplings also available—one for low pressures, and one for high pressures.



REPRESENTATIVES  
IN  
PRINCIPAL  
CITIES

### Quick-Connective Fluid Line Couplings for

Oil • Hydraulic Fluids  
Grease • Steam • Water  
Refrigerants • Acetylene  
Air • Oxygen • Vacuum  
Gasoline • Coolants

Write for Catalog

SINCE 1915

QUICK-CONNECTIVE FLUID LINE COUPLINGS

THE HANSEN

MANUFACTURING COMPANY

4031 WEST 150th STREET • CLEVELAND 11, OHIO

# Engineers...

## Look

## ten years

## ahead!



*A Douglas engineer lives here*

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and location  
allow you to live  
in a home  
like this...  
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leisure time  
like this?

***They can...if you start your  
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Douglas has many things to offer the career-minded engineer!

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...and there's every prospect that in 10 years you'll be where you want to be professionally, and you'll be in both the income level and geographical location to enjoy life to its full.



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# DOUGLAS



## First in Aviation

## HAND INJURIES

cost you plenty...



## HAND PROTECTION

can be costly, too!

## YOU CAN REDUCE BOTH COSTS WITH JOMAC HR GLOVES

Protect your workers with Jomac HR Gloves—and you'll cut your annual bill for safety way down! Jomac HR's provide rugged, dependable hand protection. Made of famous loop-pile Jomac Cloth, they cushion hands against sharp or heavy objects—insulate them against heat. And Jomac HR's really take the bite out of your glove costs—because they last and last. Here's why:

- they're made of long-wearing brown-and-white mock twist yarn
- they're interchangeable; any two make a pair, so each pair provides four long-wearing surfaces
- they can be washed or reconditioned many times over
- on-the-job tests have proved they outwear other gloves by a margin of 3 to 1!

Try Jomac HR Gloves for dependable protection and long, economical wear. Jomac makes a complete line of work gloves and wrist-to-shoulder protection. Send for prices and complete details.



## JOMAC INDUSTRIAL GLOVES

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Name.....

Company.....

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City.....State.....

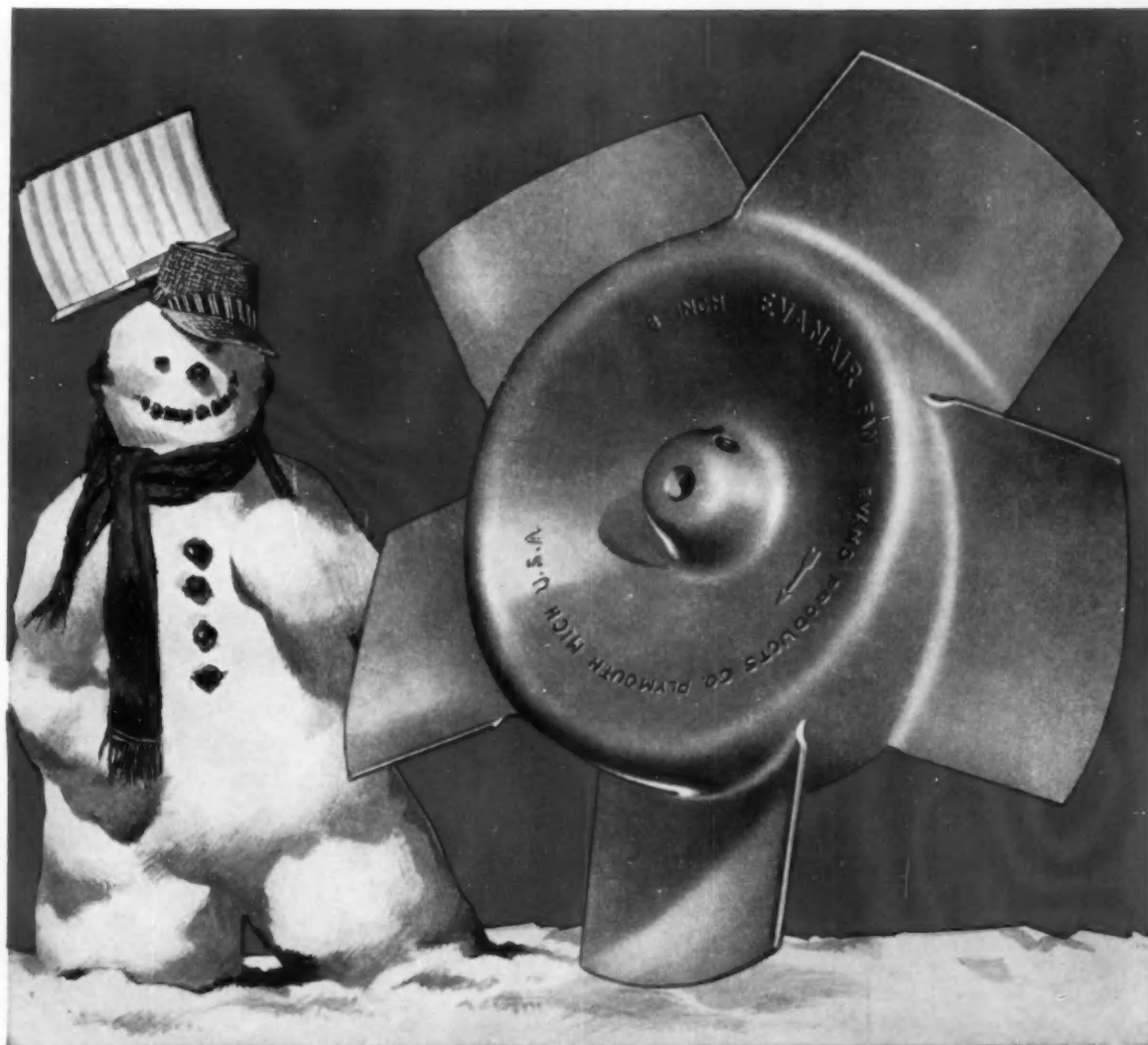
Research and Development Division. The new division will provide advanced engineering concepts leading to new or improved products; and it will also assist the sales department to seek out or create new markets and to coordinate activities with technical and operational departments. Emphasis will be placed upon the development of fluid mechanisms—hydro-mechanical devices, systems and controls—for use in aircraft and industrial fields.

## BOOKS...

**AUTOMOTIVE ELECTRICAL SYSTEMS**, edited by I. Frazee and E. L. Bedell, published by American Technical Society, 848 East 58th St., Chicago 37, Ill. Price, \$6.25. This book has been revised to include full coverage of 12-volt electrical systems. The editors have included a chapter on electrical theory, which provides an excellent groundwork for the beginner to the chapters that follow. The bulk of the book is devoted to trouble shooting procedures for the various circuits and appliances comprising automobile electrical systems. The storage battery, generator, cutouts, and regulators are covered separately and then as components of a complete circuit; the same approach is applied to the starting system, light systems, horns, sirens, instruments and gauges.

**MACHINE TRADES BLUEPRINT READING**, by E. W. Ihne and W. E. Streeter, published by American Technical Society, 848 East 58th St., Chicago 37, Ill. Price, \$2.95. The third edition of this manual of blueprint reading has been extensively revised to incorporate the latest teaching methods. In their new approach, the authors emphasize the difference between the draftsman, whose basic function is to represent an object, and the machine tradesman, whose job is to produce the object on the basis of information contained in the blueprint. To meet the needs of the latter, the authors have devised a step-by-step method of guiding the student in visualizing an object from a blueprint. The first part of the book contains a comprehensive discussion of the basic principles of blueprint reading; the second part, covering 104 pages, contains typical industrial prints, each with a full-page question sheet.

**ASTM STANDARDS ON COPPER AND COPPER ALLOYS**, published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price, \$5.75. This handy volume contains all the ASTM Standards pertaining to copper and copper alloys which were developed by ASTM Committee B-5, B-1, and B-2. Standards cover copper, copper-alloy, and copper-covered-steel electrical conductors; copper and copper-alloy plate, sheet, strip, and rolled bar; copper and copper-alloy rod, bar, and shapes, and die forgings; copper and copper-alloy wire; copper and copper-alloy filler metal; and methods of test for copper and copper alloys. Of the material included in this compilation, 50 of the specifications have been revised and a new specification for threadless copper pipe has been added since the previous edition.



## A Fan for COLD Weather?

Use a fan in winter? Certainly, when it has built around it the best heating unit you can install in your trucks!

Evans truck heaters have this one-piece alloy fan. It never loses its balance, won't chip, crack or bend, has no parts to work loose. It weighs less than half as much as ordinary fans, yet it delivers more volume with less vibration and motor wear.

This exclusive fan, which was designed and developed right in our own laboratory, is typical of the heavy-duty components used in Evans Heaters — heaters which are custom-built to your truck requirements. The best materials and the best construction combine to give you a heater unit that matches your trucks in quality, performance, long life

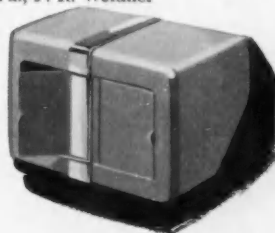
... and every Evans Heater is backed with a parts "repair or replace" warranty good for a full year or 50,000 miles, whichever occurs first.

A complete heater catalog is yours for the asking. If you have a truck heater problem, our engineers will be glad to help you solve it. There's no charge for this service. Write Evans Products Company, Dept. P-10, Plymouth, Michigan.

**Regional Representatives:** Cleveland, Frank A. Chase . . . Chicago, R. A. Lennox Co., Inc. . . . Detroit, Chas. F. Murray Sales Co. . . . Allentown, Pa., P. R. Weidner

### EVANS TRUCK AND BUS HEATERS AND VENTILATING SYSTEMS

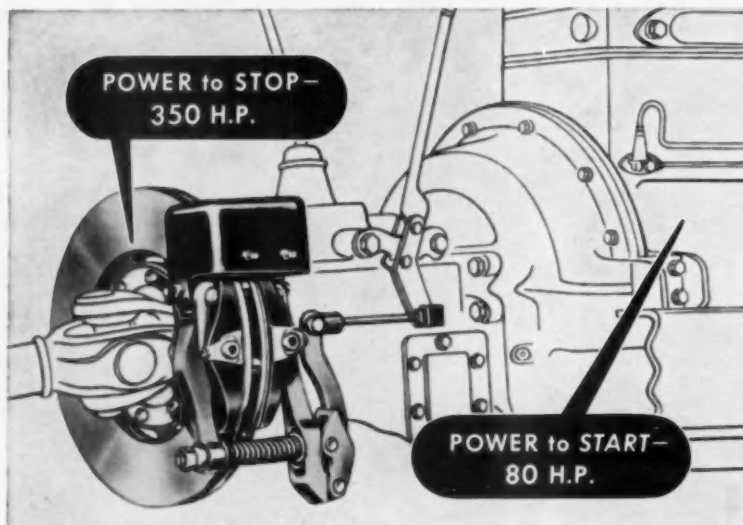
**EVANS PRODUCTS COMPANY** also produces: railroad loading equipment; bicycles and velocipedes; Evaneer fir plywood; Evanite battery separators and Evanite hardboard.





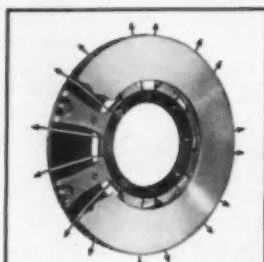
## It pays to specify Tru-Stop Brakes

FOR LONG LIFE—EASY SERVICE



### Have the surplus braking power emergency service requires

• In terms of horsepower, brakes actually do more work than the engine. For example:



#### Air-cooled for Long Life

• The terrific heat generated in braking shortens lining life. TRU-STOP design quickly dissipates this heat. Most of the disc is exposed to the air even during braking. And a jet of cooling air circulates between the disc blades and carries off heat.

Where it takes 80 H.P. to accelerate to 20 miles per hour, 350 H.P. is required to make a safe stop at that speed within required limits.

TRU-STOP Emergency Brakes have the surplus braking power required for emergency service. That is why they are more adequate for use as parking brakes.

TRU-STOP Brakes lower service costs, too. Relining or adjustment is a simple job for any mechanic with ordinary tools. It is not necessary to drop the drive shaft.

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**Automotive and Aircraft Division  
AMERICAN CHAIN & CABLE**

601 Stephenson Bldg., Detroit 2  
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A giant tank truck can be loaded with gasoline at the rate of 400 gal a minute—that's a load of 5000 gal in less than 15 minutes.

People living in the immediate neighborhood account for about 80 per cent of the average service station's business.

American farmers today have nearly \$20 billion worth of equipment that needs fuel and lubricants from the oil industry.

Currently, it costs the oil industry an average of \$1.08 to find each new barrel of oil in the ground.

Forty years ago, in 1916, the annual interest charge on the then outstanding Government debt was about \$23 million. In fiscal 1956, net Federal budget spending for all items (national security excluded) was about 1000 times as much as the old interest payments: \$23 million vs \$25 billion.

One gage, used to check automotive hydraulic valve lifters costs \$45,000.

Wing tanks on a heavy jet bomber are as large as some fighter aircraft.

A wind tunnel used to test aircraft models is four stories high and its huge motors produce winds of more than 1400 mph.

The wing of a medium jet bomber will support a stack of automobiles as high as the Washington Monument.

Tolerances on some automobile engines are held to three-tenths of one thousandth of an inch, or about one-tenth the thickness of a human hair.

*if suddenly*

your products  
begin to  
test more  
faithfully to  
design . . .

If your production  
line is running  
more smoothly . . .

If "identical"  
installations  
stop showing  
varied results . . .

If rejects drop . . .  
or stop . . .

*then maybe*

some intelligent  
person in your  
design, engineering,  
purchasing or  
production  
department  
has been specifying

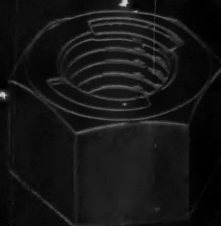
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THAT ENABLES YOU TO  
PREDICT...AND  
MAINTAIN**

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**LOCK NUT**

Also a complete line of semi-  
finished hexagon nuts in all series.  
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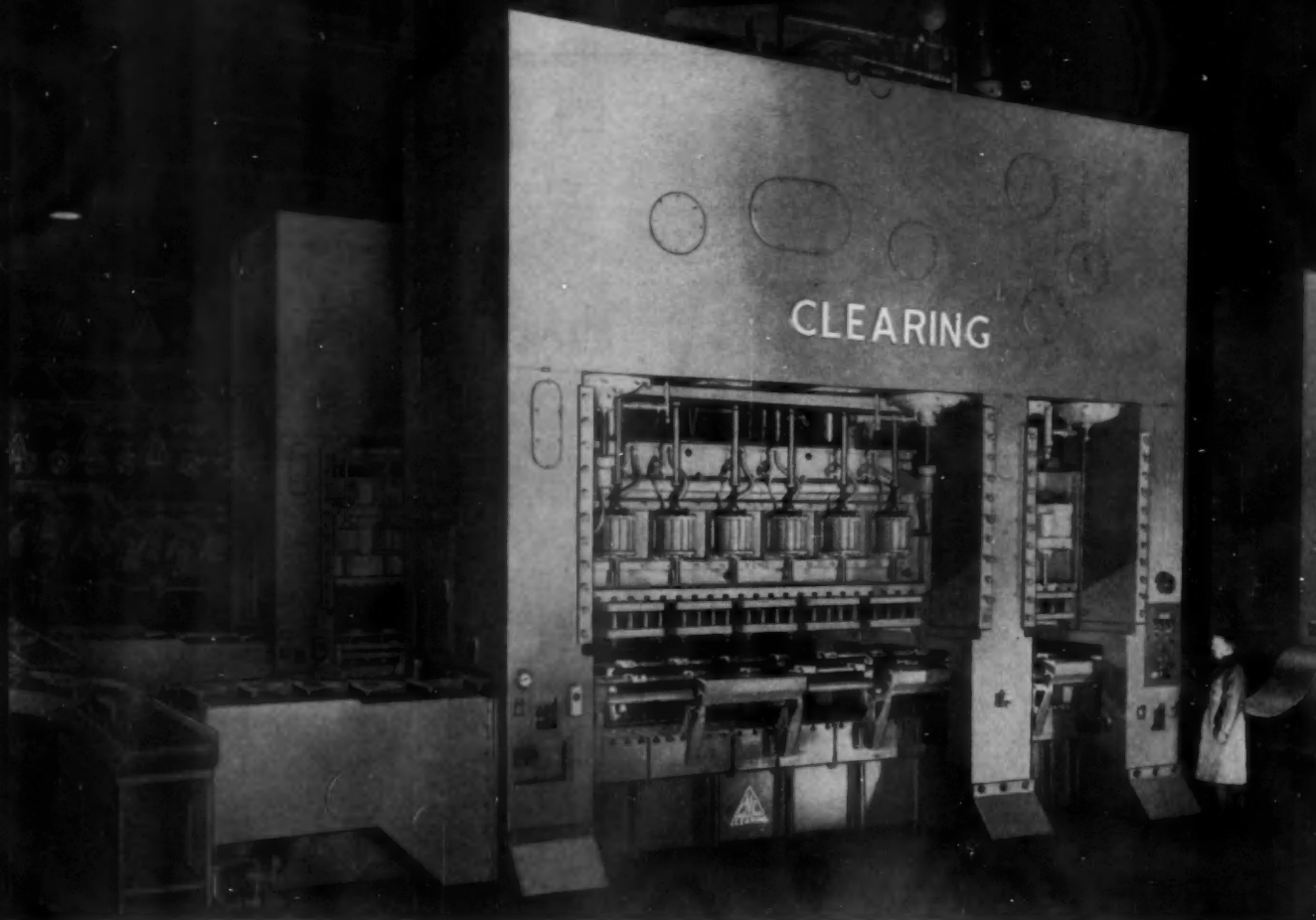


**UNIFORM  
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TENSION**

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# How one automotive manufacturer

## The Press that takes Model Changeover in Stride

Here's a press that's fully automated—parts are automatically fed, moved through the sequence of dies and unloaded without manual effort.

Yet this is no single purpose machine. It's a Clearing Transflex.

Transflex Presses put an entirely new light on the economies of mass production. When the entire cost of the proposed automated equipment had to be written off against one product, this severely limited the possible applications of transfer presses. It required an extremely large volume of production and confidence in the stability of product design to justify such a one purpose expenditure.

Transflex takes the risk out of these calculations.

Clearing engineers have designed Transflex so that it takes model changeover in stride. Transflex

is not only capable of rapid adjustment for model changes, it is so versatile it can be used to regularly produce a variety of parts. The basic features that give Transflex its chameleon-like adaptability—adjustable feed, knockouts and cushions—are illustrated at right. Additional principles, such as moving bolsters and modular construction can further increase the flexibility of Transflex equipment.

A battery of Clearing Transflex presses including the one above has solved the "automation without risk" problem for a large automotive manufacturer. However, boosting production for your company may take an entirely different approach. Clearing engineers deal with matters like these daily. Why not call on them for a discussion of improved production through Transflex? There'll be no obligation, of course.

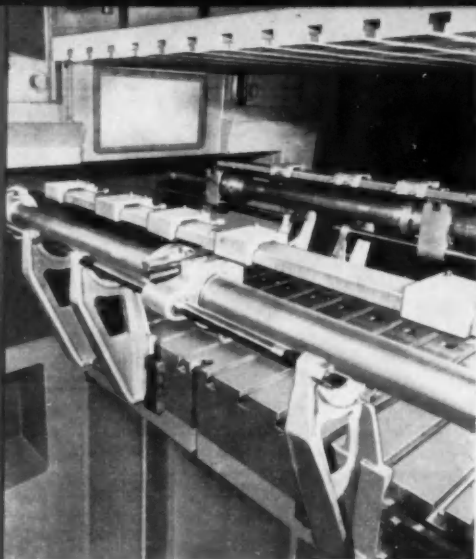
# CLEARING PRESSES

**CLEARING MACHINE CORPORATION**

6499 W. 65th Street, Chicago 38, Illinois

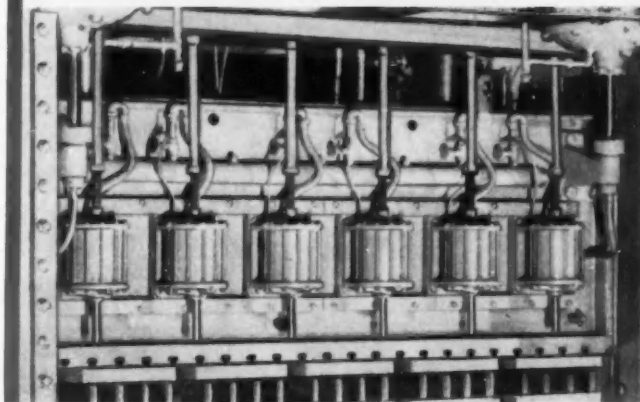
#### ADJUSTABLE FEED

Both the length of feed stroke and the spacing of the transfer fingers are easily adjustable on a Clearing Transflex Press. Fingers are quickly interchangeable to grip a variety of contours and hold a number of sizes.



#### ADJUSTABLE KNOCKOUTS

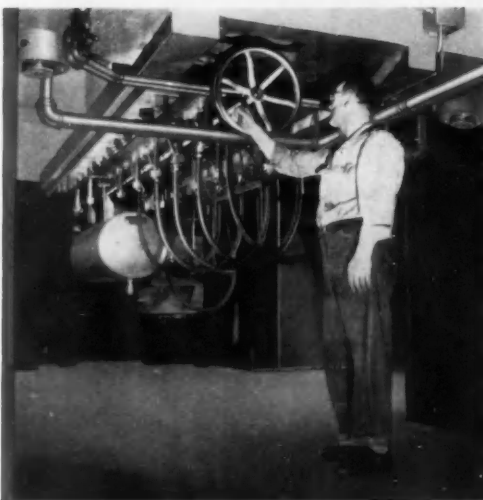
The Transflex knockout arrangement utilizes a series of air cylinders to eject pieceparts at each die station. Cylinders are mounted on ways and are easily moved right and left to conform to changed die arrangements. Positive mechanical knockouts provided as a safety factor are also mounted in tracks, making them fully adjustable.



## uses **TRANSFLEX**

#### ADJUSTABLE CUSHIONS

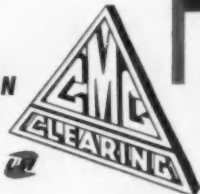
The man shown at right is turning the cushion adjusting wheel in order to re-align the cushions to the right or left in a Transflex press. Cushions are self-contained and internally guided, and are mounted on gibways to facilitate adjustment.



Bulletins on Transflex presses will be sent promptly at your request. Write for these fact-filled bulletins today.

**THE WAY TO EFFICIENT MASS PRODUCTION**

**Division of U. S. INDUSTRIES, Inc.**  
Hamilton Plant, Hamilton, Ohio



## Torque Control Tools in Ford Assembly Plant

(Continued from page 56)

speed, since the preset torque in the torsion bar automatically stops the tool, the 5040T torque control Impactool accomplishes the work in less time than was necessary with other air tools. Additionally, the safety hazard has been eliminated as practically no torque is received by the operator.

In another operation on the passenger car line, all Ford automobile transmissions (standard, overdrive

and automatic) are bolted to the engine by four  $\frac{5}{8}$ -in. bolts at a torque of 45-50 lb ft. Previously, the job was done with an angle-type air tool run to a stall. It was necessary to use an extension to reach the bolts and the angle tool was awkward to handle in the required position. Also, torque control was uncertain. The new tool does the job quickly, stopping automatically as the required torque is

reached, and assuring production uniformity.

On the truck assembly line, the new torque control Impactool is performing another operation, securing the steering gear assembly to the truck frame. In this operation, three  $\frac{5}{8}$ -in. hexagonal bolts are run to a torque of 45-60 lb ft. With the air tool which had been used on this job it was necessary to check each bolt with a hand torque wrench to insure uniformity. The Ingersoll-Rand 5040T Impactool, with torque preset in the torsion bar, quickly runs the three bolts to the prescribed torque. As a result of the uniform torque control achieved with the new tool, it is no longer considered necessary for the operator to put a hand torque wrench on each bolt; an occasional spot check is all that is required.

## ULTRASONIC METAL CLEANING—BETTER, AT LESS COST!

# Ransohoff

**automatic  
indexing double  
monorail  
conveyor**

**with Bendix-perfected  
ultrasonic unit**

**Conveyorized  
Ultrasonic  
Cleaning  
System**

**"Scrubs with Sound"  
saves time,  
space and money**

- Wash • Rinse
- Ultrasonic Cleaning
- Rinse • Dry

Combining an ingenious conveyor design with proven Bendix ultrasonics, the Ransohoff Conveyorized Ultrasonic System handles "impossible" cleaning jobs on an entirely automatic basis!

No part is too difficult to clean economically . . . regardless of blind holes and difficult recesses in castings, engine parts, valve bodies, etc. No part is too fragile to be thoroughly cleaned by this

method.

The pictured 5-stage ultrasonic machine performs a complete cleaning job—fast and automatically. Operations include: wash, rinse, ultrasonic cleaning, rinse and dry.

For complete details of Ransohoff ultrasonic cleaning systems and other equipment, write **Ransohoff, Inc., 680 North Fifth St., Hamilton, Ohio.**

# Ransohoff

*An old name... the newest ideas*

## Ford's New Fuels System Laboratory

(Continued from page 104)

up by the air as it passes through the vacuum pump, because the pump is a water-sealed unit.

A carburetor or the injection control body of a fuel injection unit is placed in a testing compartment on which the door has an air-tight seal. Fuel is fed to the unit, and the vacuum pump, connected with the air-tight compartment, pulls air through the orifices and thence through the carburetor. This makes possible the high precision measurements of air flow, as well as pressure changes.

Other test stands in the laboratory are components test rooms for testing specialized induction components, injection pumps and nozzles, carburetor jets, carburetor accelerator pumps, power valves, and fuel pumps.

The laboratory is equipped with a small machine shop called a "re-work room," and a garage where carburetors may be removed for immediate test runs through the laboratory.

The facility is sound-proofed and air conditioned, and is protected by latest fire, safety and explosion-proof measures.

**Readers of  
AUTOMOTIVE INDUSTRIES  
are always well informed**

New equipment, expanded departments, added technical personnel and increased productivity all help to make Long your ideal "production partner."

But you'll discover Long's real plus factors in our management-engineering team. Its talent for creating high quality products with economical design and volume manufacturing advantages is your biggest profit potential.



## **LONG-BUILT TRACTOR RADIATORS GIVE TOP PERFORMANCE**

Tractor engines need specialized cooling to do the best possible job. Leading tractor manufacturers specify Long-built radiators because they are rugged and dependable; because they are engineered for the best performance under the severest field requirements.

Since 1903 Long has been engineering and building high quality heat exchangers for industry. Whatever the type of fuel used, your engine cooling can be improved. Ask us for help on your problem.



**LONG MANUFACTURING DIVISION, BORG-WARNER CORPORATION**  
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THE STANDARD OF QUALITY AND PERFORMANCE SINCE 1903

# NEW

**THE ONLY**

## **SURFACE GRINDER with a POSITIVE SAFETY SHUT-OFF!**



### **PLUS THESE OTHER COST-SAVING OPERATING ADVANTAGES:**

- Handles can be set at 90° or 120° for close corner work and operator comfort... another Ingersoll-Rand FIRST!
- A responsive governor insures maximum cutting speed and minimum air consumption regardless of load.
- Single point lubrication, double-sealed wheel bearings, large oil reservoir for long life, low cost operation.
- Top of tool is flat for easy pressure application.
- Available in 2 Models and 4 speeds as follows:
  - Speeds: 3100—4100—4500—and 6000 rpm.
  - Size 41F with push-locking throttle for constant operation.
  - Size 41FX with self-closing, safety type throttle.

Ask for a demonstration of this new safety grinder in your shop.

8-343

# Ingersoll-Rand

11 Broadway, New York 4, N.Y.

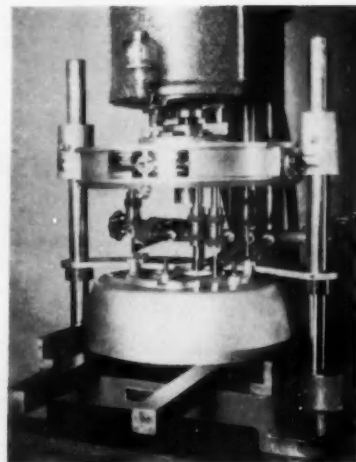
## **New Production**

(Continued from page 87)

### **Lead Screw Tapping Unit**

A LEAD screw tapping unit which taps four holes to different depths, then reverses and backs out the taps, while using a continuously-running unidirectional motor, was recently unveiled. This feature is accomplished with two Warner electromagnetic clutches, one for feeding and one for reversing.

The automatic lead screw unit is a self-contained, electrically-controlled and actuated device which has been developed for single or multiple spindle tapping. Use of the fractional horsepower forward and reverse clutches eliminates the need for a reversing motor and increases the speed of the tapping operation. The torque output of the clutches can be varied by a rheostat control, providing sensitivity for small taps, as well as the power required to drive large taps. It is said that since the actuating force (electric current) is the same as the motive force (magnetic flux), engagement and release of the clutches is instantaneous; and, in fact, can be controlled to operate within milliseconds. This type of driving force is also said to eliminate any end pressure on the lead screw or



Effco-Emrick tapping unit taps four 10-24 holes to different depths with a unidirectional motor

## and Plant Equipment

taps, and as a result, the threads cut are as accurate as the taps or dies used.

Operation of the clutches is as follows: The armature of the downfeed clutch is keyed to the drive shaft of the motor, the rotor is mounted on the lead screw, and the stationary field is mounted on an internal bracket. On the reversing clutch, the armature is bearing-mounted on a sheave driven by a v-belt from a reversing idler pulley, the rotor is keyed to the lead screw, and the stationary field is mounted on a bracket.

When the operator presses the start button, the downfeed clutch is energized and current flows in the stationary field. Magnetic flux passes through the rotor (keyed to the lead screw) and locks it to the armature (keyed to the motor drive shaft) in full magnetic couple, thus driving the lead screw and tap through the work. When the depth for which it is set is reached, a nut actuates a snap-action switch, the downfeed clutch is de-energized, the reverse clutch is energized (and functions like the downfeed clutch), and the lead screw and tap reversed and run out of the work. Another snap-action switch is actuated at the top of the travel of the lead screw and the reverse clutch is de-energized and the cycle ended.

*Etteo Tool Co.*

Circle 55 on postcard for more data

### Carbide End Mills

**S**OLID carbide end mills of four-flute design with spiral fluting, are now available in a new series comprising standard diameter sizes of  $\frac{1}{8}$ ,  $\frac{3}{16}$ ,  $\frac{1}{4}$ ,  $\frac{5}{16}$ ,  $\frac{3}{8}$ ,  $\frac{1}{2}$ ,  $\frac{5}{8}$  and  $\frac{3}{4}$ -in. Cutting lengths range from  $\frac{5}{16}$ -in. for the  $\frac{1}{8}$ -in. diam, to  $1\frac{1}{4}$ -in. for the  $\frac{3}{4}$ -in. diam. Special lengths, diameters and other variables from the stock sizes are obtainable on special order.

Their use is proposed for milling operations such as side milling, profiling, slotting, and die and mold work; and they are said to be particularly adaptable when used for production milling on tough, abrasive materials, including plastics. *Severance Tool Industries, Inc.*

Circle 56 on postcard for more data  
(Turn to page 140, please)



# 15,000

$\frac{3}{4}$ " bolts uniformly tightened to 60 ft. lbs.



with new Ingersoll-Rand

## Torque Control IMPACTOOL

### PROBLEM:

Assembly of 1390 mechanical pipe joints involved over 15,000  $\frac{3}{4}$ " bolts. The problem was to speed assembly, remove guesswork and assure proper tightness of all joints.

### AIR ENGINEERING SOLUTION:

A new Ingersoll-Rand Size 5040T Torsion Bar Torque Control Impacttool, preset to deliver 60 ft. lbs., was put on the job.

### RESULT:

The Torque Control Impacttool automatically shut off at the preset Torque . . . all guesswork was eliminated . . . uniform joint tightness was produced . . . an average of 10 minutes per joint was saved . . . smaller bell holes were required due to compact size of the 5040T . . . this one tool produced an extra profit of \$404.25 on this job.

You can put these new "Torsion Bar" Torque Control Impacttools on your nut running jobs and reap these benefits: Positive Torque Control . . . Simple Torque Setting . . . Setting remains constant . . . No pressure regulators needed . . . No operator training. Write or phone for a free demonstration of this revolutionary fastening development.

# Ingersoll-Rand

11 Broadway, New York 4, N.Y.

8-344

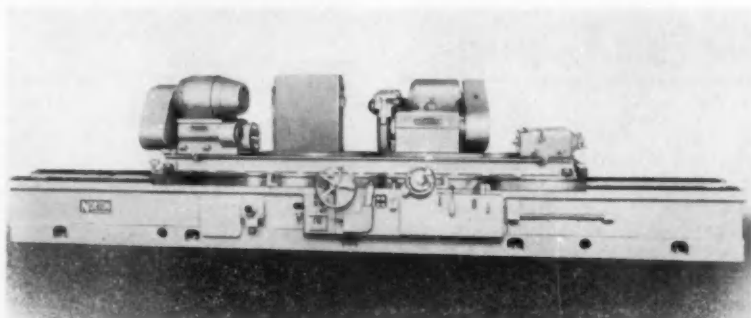
## New Production and Plant Equipment

(Continued from page 139)

**A**NNOUNCEMENT has been made of a new line of heavy-duty cylindrical grinders, designated the 14-in. Type C-2 and the 18-in. Type LC-2, and designed to handle workpieces up to 6500 lb on centers.

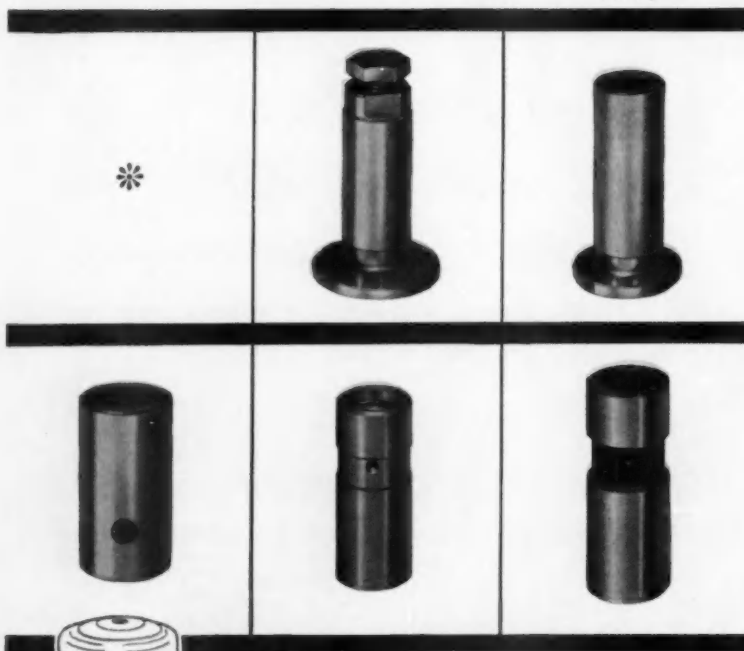
Location of all controls for feeds and speeds on the front of the ma-

## Cylindrical Grinders for Heavy Workpieces



Norton 14-in. Type C-2 heavy-duty cylindrical grinder.

## JOHNSON *tappets*



*\* keep pace with today's engines*

Continual experimentation and excellent manufacturing methods show a steady product improvement that make JOHNSON TAPPETS worthy of your consideration.

Only proven materials, covering a range of steel, chilled iron, and various iron alloys are used in the manufacture of JOHNSON TAPPETS, providing greater strength, light weight and increased wear resistance.

Serving the AUTOMOTIVE — AIRCRAFT — FARM — INDUSTRIAL — MARINE Industries.

*"Tappets are our business"*

# JOHNSON PRODUCTS

INC.

MUSKEGON, MICHIGAN

chine at the operator's position is said to be a time-saving feature, particularly for setting-up operations. Another feature is the combination graduated wheel feed hand wheel and "click-count" indexing mechanism. The graduated hand wheel continually indicates the amount of infeed as the wheel rotates past a fixed pointer. The indexing mechanism permits quick settings in increments of 0.0001 in. work diameter reduction, without visual attention.

Pre-set table truing and grinding speed arrangements are other features. Table speeds for truing and grinding are independently adjustable and pre-set. Either speed is immediately obtained thereafter by movement of a combination selector and table start-stop lever. Continual setting of these speeds is avoided.

Additional stated features include a work jogging lever, centrally located; automatic or manual control of work rotation and coolant flow by setting a selector switch; automatic adjustable wheel feed at table reversals, with automatic wheel head resetting and separate dwell controls for each end of table reversal.

Table drive by hydraulic power is available from 2 to 240 ipm. The pressure lubricated wheel spindle bearings enclose over 50 per cent of the spindle body for maximum rigidity and resistance to grinding pressures. The 14-in. Type C-2 and 18-in. Type LC-2 machines are available as plain grinders or semi-automatics. The semi-automatics have the advantages of the plain grinders plus the addition of an automatic grinding cycle which operates under one-lever control. Norton Co.

Circle 37 on postcard for more data

(Turn to page 144, please)

# ***NEW* THREAD CUTTING FASTENER**

- LOW COST
- RE-USABLE
- SELF-LOCKING
- VIBRATION-PROOF
- SPRING TAKE-UP

*Pulls up tight  
without backup on  
flat or contoured surfaces*



Specially designed to hold die-cast or cold-forged name plates, emblems and trim against sheet metal surfaces, DOT's new T. C. F. cuts clean, deep threads on unthreaded studs, even those that are chrome plated. Immediately available to fit 1/8" and 3/16" studs.

When used with its pre-assembled plastic sealer, the new T. C. F. makes a watertight seal. The sealer *precedes* the fastener onto the stud so that it is not damaged by the thread-cutting process.

Available in quantity with or without sealer from Monadnock Mills subsidiary and Carr Fastener Division.

*United-Carr's design staff is ready to apply the same engineering creativity that produced the T. C. F. and thousands of other special-purpose fastening devices to the solution of your special fastening problems. Field representatives are located in most principal cities.*



T.C.F. for 1/8" stud shown actual size. Also available for 3/16" stud.



T.C.F. for 1/8" stud with plastic sealer.

**MONADNOCK MILLS**  
SUBSIDIARY  
San Leandro, California



**CARR FASTENER CO.**  
DIVISION  
Cambridge, Massachusetts

UNITED - CARR - FASTENER - CORPORATION

# SPICER ENDS

*Spicer Thornton POWR-LOK Keeps Power*



SPICER THORNTON POWR-LOK CONTROLS "WILD WHEELS" ON SNOW, ICE, MUD



SPICER THORNTON POWR-LOK CONTROLS "WILD WHEELS" ON ROUGH, BUMPY ROADS

**DANA CORPORATION • TOLEDO 1, OHIO**

# "WILD WHEELS!"

## Geared to BOTH Driving Wheels!

**T**HE Thornton POWR-LOK principle is another in the ever-growing list of safety- and power-transmission innovations developed by Dana engineers and Dana resources. It is a new concept of controlled driving-wheel power . . . the most revolutionary rear axle design in volume production since the invention of the differential itself!

The Thornton POWR-LOK Differential in Spicer Axles now makes possible the automatic delivery of controlled torque to BOTH driving wheels under all tractive conditions, and ends "wild wheels" often occurring in ordinary axles.

No more "wild wheels" that spin uselessly in mud,

ice, sand or snow. The Thornton POWR-LOK Differential enables the wheel with the *better* traction to apply the *major* driving force to the road, thereby enabling the vehicle to move.

No more "wild wheels" that spin at high speed when bounced into the air by bumps or holes and then come down with sudden stoppage, causing dangerous car swerve or destructive tire scuffing.

The Spicer Thornton POWR-LOK keeps delivering safe, controlled torque to BOTH wheels at all times, adjusting itself instantly to varying road conditions, and assuring steady propelling action to the vehicle.



Write for brochure illustrating and describing the efficiency and safety aspects of the new Thornton POWR-LOK Differential as now offered exclusively in Spicer Axles. Available for passenger cars, and light and medium-duty commercial vehicles.



# Spicer

**SPICER PRODUCTS:** TRANSMISSIONS • UNIVERSAL JOINTS • PROPELLER SHAFTS • AXLES • TORQUE CONVERTERS • GEAR BOXES • POWER TAKE-OFFS  
POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES • STAMPINGS • SPICER and AUBURN CLUTCHES • PARISH FRAMES • SPICER FRAMES

# Doing the Hole Job-

**Better, Faster, at Lower Cost**

## BESLY TAPS

**with UNSURPASSED  
ACCURACY  
at all vital points**

● LET US PROVE that Besly can help you get better threaded parts, longer tap life and lower tapping costs. Ask your authorized Besly Distributor for a TRIAL RUN on your toughest jobs . . . PLUS details on Besly's Super-Service on "Specials".



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DRIVER**



**Mirror-Finish  
FLUTES**



**Solid Ground  
THREAD FORM**



**Accurate  
RAKE ANGLE**



**Microcentric  
CHAMFER**



**BESLY-WELLES  
CORPORATION**

Established as Charles H. Besly & Co. in 1873  
132 Dearborn Avenue • South Beloit, Illinois



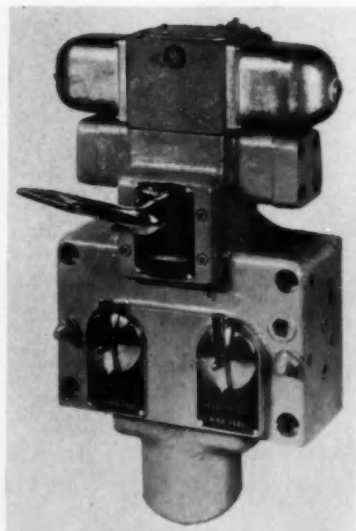
## New Production and Plant Equipment

(Continued from page 140)

### Traverse-Feed Panels

THREE new series of sub-plate mounted traverse and feed panels for control of industrial oil-hydraulic systems, are said to be ideally suited to semi-automatic and fully automatic control of drilling, reaming, boring, turning, milling, swaging and grinding machines. All three series, designated CPP, CPN and CPD, feature improved valve sections for direction and feed control. Each is available in a selection of models to meet a full range of system requirements. They are designed for use with 3/4-in. nominal pipe size. Maximum recommended operating pressure is 1000 psi.

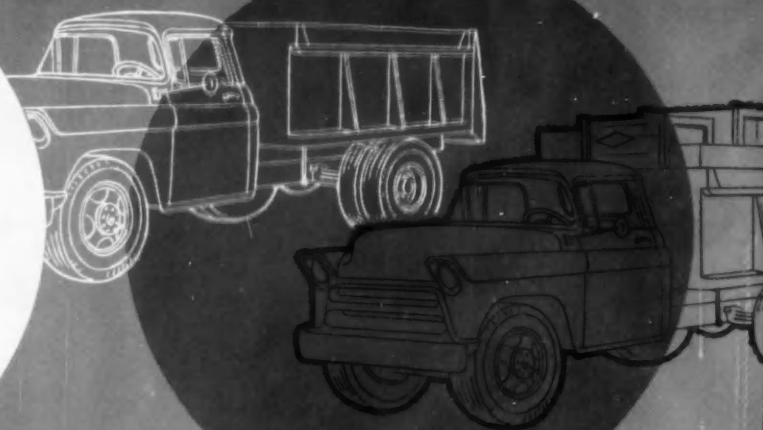
The redesigned flow control valve section includes two locking type dials which permit independent selection of both fine and coarse feed rates. Adjustment of both rates is infinitely



*Vickers CPP traverse and feed panel*

variable within the specified range and can be made during the feeding operation. Transition from rapid advance through the successive steps of coarse feed, fine feed and stop or dwell is handled automatically within the panel by the position of the main spool. The sequence is obtained without dead spots between phases. Phases can be initiated by manual, mechanical, electrical or hydraulic actuation

**YOUR TRUCKS  
CAN HAUL  
HEAVIER  
LOADS**



**with NEW BORG & BECK A8 and A9 CLUTCHES**

**NEW THREE-LEVER DESIGN**

**LIGHTER WEIGHT—SHALLOWER**

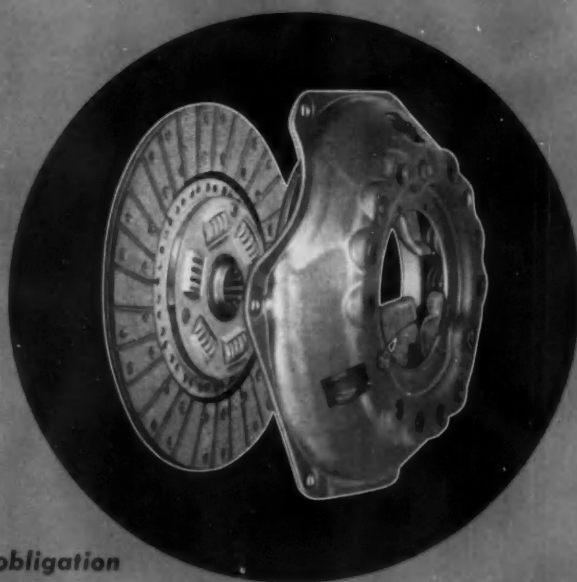
**ARCH TYPE CONSTRUCTION FOR PROPER VENTILATION**

**SIZES TO 11"—FOR ALL BUT THE LARGEST TRUCKS**

**SMOOTHER, QUIETER OPERATION**

**EASIER ADJUSTMENT FOR MINIMUM MAINTENANCE**

**PRECISION BUILT—TESTED FOR BALANCE, UNIFORMITY**



*Consult our engineers—no obligation*



Reg. U. S. Pat. Off.

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**for that vital spot where power takes hold of the load!**



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**BORG & BECK DIVISION**

BORG-WARNER CORPORATION • CHICAGO 38, ILLINOIS



The Lepel line of induction heating units represents the most advanced thought in the field of electronics as well as the most practical and efficient source of heat yet developed for industrial heating. With a background of half a century of electrical and metallurgical experience, the name Lepel has become the symbol for quality in induction heating equipment embodying the highest standards of engineering achievement, dependable low cost operation and safety.

If you are interested in the application of induction heating you are invited to send samples of the work with specifications of the operations to be performed. Our engineers will process these samples and return the completed job with full data and recommendations without any cost or obligation.

### TYPICAL INDUCTION HEATING APPLICATIONS



A Lepel installation at Federal Telephone and Radio Co. shown soldering transformer terminals. A precision operation made so simple that even unskilled operators can achieve excellent results on a production basis.



The simultaneous soldering of a group of components within one lead coil is an ideal application for induction heating. The assemblies consist of mounting studs and tubes inserted into a machined part together with preformed solder rings. The heating is done so rapidly that there is practically no scaling or discoloration.



**Electronic Tube Generators—1 KW; 2½ KW; 5 KW; 10 KW; 20 KW; 30 KW; 50 KW; 75 KW; 100 KW.**  
**Spark Gap Converters 2 KW; 4 KW; 7½ KW; 15 KW; 30 KW.**

WRITE FOR THE NEW LEPEL CATALOG . . . 36 illustrated pages packed with valuable information.



All Lepel equipment is certified to comply with the requirements of the Federal Communications Commission.

**LEPEL HIGH FREQUENCY LABORATORIES, INC.**

55th STREET and 37th AVENUE, WOODSIDE 77, NEW YORK CITY, N. Y.

of the main spool. Thus the panels are said to possess the necessary operating characteristics for use in semi-automatic or fully automatic installations.

Series CPP panels consist of the flow control valve section in combination with a version of the new DG4 solenoid-operated directional valve. Models in this series can be used to control fully-automatic machining operations. In this design, energization of the electrical solenoids shifts a pilot valve which through a hydraulically-operated mechanical linkage shifts the main valve spool for directional control. An internal check valve is included to provide pilot pressure. A manual operating lever is provided for set-up.

Series CPD models of the 11 design consist of the flow control valve section combined with solenoids. In this arrangement, the main spool is directly operated by energizing the electrical solenoids. CPD units are also applicable to fully automatic operations. These models likewise include a manual lever.

Series CPN panels comprise the flow control valve section with a manual operating lever; and are designed for use with an external solenoid to actuate motion reversal. The cycle is started by operation of the manual lever. CPN models are for use with semi-automatic feed mechanisms. *Vickers Inc.*

Circle 58 on postcard for more data

### Plastic Strip Feeder

THE development of a machine which automatically feeds laminated plastic and fiber strip stock into any standard blanking press at controlled temperatures up to 300 F. was recently announced. It is said that a single loading of the magazine can produce as much as a day's run.

The strip stock, which is loaded into the magazine, rests on a special feed belt synchronized with the press through a crank arm to an indexing roll feed. As the bottom strip leaves the machine, the strip above drops into place. Positive butting of the ends is said to reduce partially blanked pieces to the minimum. An electric heating system, regulated by thermostatically-controlled heating elements, brings the stock to and maintains the desired blanking temperature. *Technical Design & Development Co., Inc.*

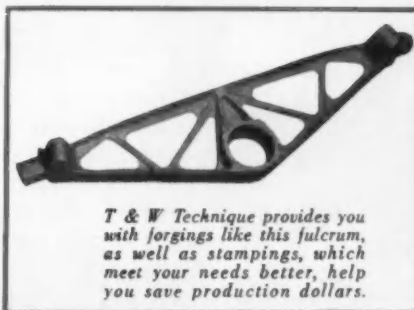
Circle 59 on postcard for more data  
 (Turn to page 148, please)

*Two-stage oil pan, 29" long, 11" wide, 13" deep, for military trucks; produced as stampings by T & W TECHNIQUE. Inset shows main stamping before trimming.*



## T & W TECHNIQUE can save production dollars for you

• If you buy stampings or forgings, then you want to know all about T & W Technique. Benefits from T & W Technique come to you in many ways — in effective design and engineering service, in extra skill which completes hard-to-produce parts without delay, in quality control, in delivery on schedule. But, always, forgings and stampings from T & W are likely to meet your needs so well that they cost you less at the point of assembly.



*T & W Technique provides you with forgings like this fulcrum, as well as stampings, which meet your needs better, help you save production dollars.*



**STAMPINGS**  
**T & W**  
**FORGINGS**

**TRANSUE & WILLIAMS**

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1306

**T & W DEEP DRAWN STAMPINGS AND FORGINGS USUALLY COST LESS AT THE POINT OF ASSEMBLY**

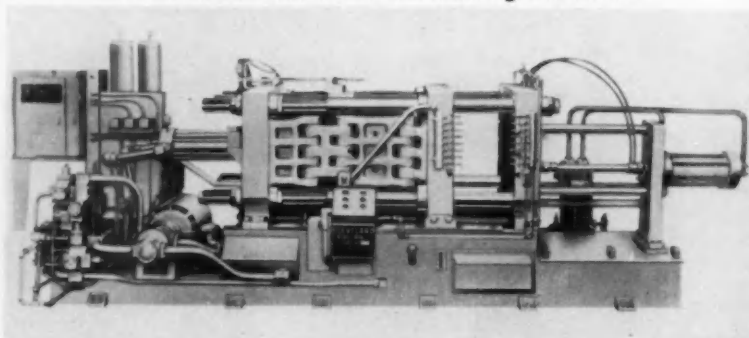
## New Production and Plant Equipment

(Continued from page 146)

**R**EPORted to be entirely new, a 600-ton die casting machine is said to include innovations which make it a fast productive machine, easy to operate and one requiring a minimum of maintenance.

The locking pressure is strain gage tested and the machine will, it is said, lock dies securely and produce

## Advanced Model Die Casting Machine

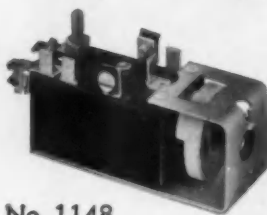


Cleveland Model 600, 600-ton die casting machine.



**3 in 1 Control!**

## FASCO HEADLAMP SWITCH with Integral Circuit Breakers



No. 1148

Available for both  
6 and 12 Volt systems.

It's new . . . but already this FASCO Headlamp Switch is accepted as "standard" by leading automotive manufacturers . . . proof of its dependable, trouble-free performance. Like all FASCO automotive electrical components, this 1148 Switch is designed right . . . built right, to meet the rigid requirements of today's cars and trucks. And that's why design engineers agree it pays to—

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AUTOMOTIVE DIVISION

**FASCO**

**INDUSTRIES, INC.**  
ROCHESTER 2, NEW YORK

DETROIT OFFICE—12737 PURITAN—PHONE: UN 17476

castings with a minimum of flash. The hydraulic circuit includes manifold construction, with all tubing over one inch having flanged fittings welded to the tubes to reduce maintenance. A 30-hp motor drives two Vickers pumps which deliver 99.7 gpm at 400 psi; the high pump capacity resulting in a fast cycling machine.

The die plates are cut from solid steel blocks to decrease deflection to the minimum; and four large diameter, high carbon steel tie bars add rigidity and resist stretching under locking pressure. Each tie bar is deep hole drilled and can be supplied with indicator rods and indicators for even distribution of locking pressure load. Heavy cast steel toggles and hardened steel toggle pins and bushings maintain pressure when the die is closed. Automatic lubrication of all wear points is provided.

The universal, automatic timing control panel is said to give all desired cycles for successful die casting and to insure uniform castings of high quality. This main electric panel is remote from the machine, thus separating electrical controls from the vibration of the machine. Push-buttons for setup and operation are located within easy reach of the operator.


Size of die plates (vertically and horizontally) is 46½ by 46-in. Space between tie bars is 28 by 28-in. Die thickness is 30-in. max, 10-in. min. Die opening is 8 to 15-in. The Cleveland Automatic Machine Co.

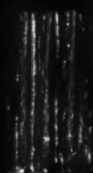
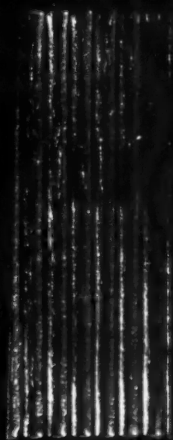
Circle 70 on postcard for more data  
(Turn to page 151, please)

**AUTOMOTIVE INDUSTRIES  
KEEPS YOU INFORMED**

# Aluminum is Texture

Aluminum can be the smoothest of mirrors, or a floor so coarse that no one will slip on it. It can brightly reflect 90% of a surgeon's light or smother a sunbeam on a sniper's rifle. Between the extremes of finishes that are infinite with aluminum, lies a world of textures for exciting design. Aluminum may be tumbled, burnished, sandblasted, scratch-brushed, hammered, buffed, etched, electro-brightened, embossed, coined, stamped, or textured by many other different ways. Alcoa's Process Development Laboratories have seldom seen a texture that aluminum will not take. It is equally true that most of the basic textures for aluminum have been pioneered or developed by Alcoa. Add texture to the list of reasons why aluminum is the designer's metal, and Alcoa your source of idea exchange.

*Look forward with*  **ALCOA**



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In Alcoa's library are many publications prepared with but one objective: to help designers and fabricators learn the basic facts about aluminum. How to design with it. How to work it. How to join and fasten it. How to capitalize on its unique advantages to get better, longer lasting, lower cost products.

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**Finishes for Alcoa® Aluminum**—a colorful, penetrating handbook prepared by the men who know the most about aluminum finishes. It includes all of the latest and most exciting finishes and tells how to achieve them.

**A New Horizon in Extruded Shape Design**—a thorough text designed to stimulate imaginative thinking about designing and applying extruded aluminum shapes.

**Metal in Motion . . . Alcoa Impacts**—the very latest facts on this fascinating way to produce complex shapes in aluminum with a single press stroke.

In addition to these newest Alcoa publications, the Alcoa library has hundreds of others, plus dozens of motion pictures. Most of these are described in a 41-page index called *Alcoa Informational Aids*. All of these films and publications are available from Alcoa for your use.

Order this index and these newest publications right now. Send your name, address and company affiliation to ALUMINUM COMPANY OF AMERICA, 2182 Alcoa Building, Pittsburgh 19, Pennsylvania.

### THESE LATEST ALCOA BOOKS



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Look forward with Alcoa



## NEW PRODUCTION and PLANT EQUIPMENT

(Continued from page 148)

### Elevating Conveyor

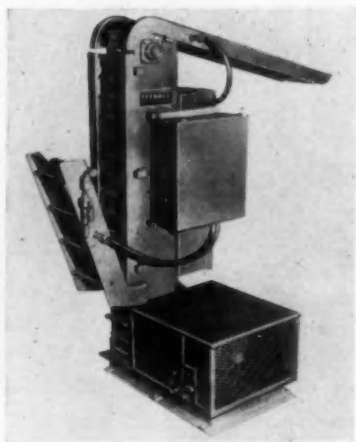
**D**ESIGNATED as Special Model 4000, a new elevating transfer conveyor is designed to transfer long cylindrical parts from one production machine to another. It accepts parts in a rolling position from the discharge chute of the first machine, elevates them, and delivers them to the magazine of the next production machine. The conveyor operates at a delivery rate adjusted to that of

stacking tube for holding the rings and a push-pull feed mechanism for sliding the rings individually under three Plunjet gaging cartridges in the gage station. Each Plunjet is connected to its own air column in the instrument.

The gage is easy to use and does not require a skilled inspector. The

operator loads the rings onto the vertical stacking tube and by means of the push-pull feed mechanism slides the rings individually into the gage station. As soon as the ring comes in contact with the three cartridges, the operator glances at the position of the floats in the instrument to see whether or not the ring is within tolerance and size classification. Parallelism is indicated by the relative positions of the three floats. *The Sheffield Corp.*

Circle 72 on postcard for more data  
(Turn to page 153, please)



Feedall Special Model 4000 conveyor

the second machine and is equipped with a bank control which shuts off the first machine if it is feeding faster than the second machine can handle parts.

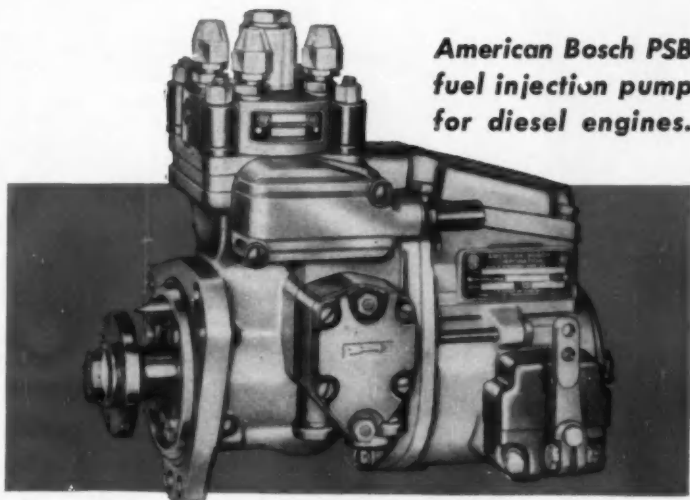
This unit will handle cylindrical parts from  $\frac{3}{8}$  to  $1\frac{1}{4}$  in. diam and up to 12 in. long. Power is furnished by a  $\frac{1}{4}$ -hp, 220/440-v motor through a variable speed drive. It can be modified to meet individual requirements. *Feedall, Inc.*

Circle 71 on postcard for more data

### Retainer Ring Gage

**N**ow available is a new gage that measures thickness and parallelism of half-moon type retaining rings at three places and permits size classification in "tenth" (.0001) increments for selective assembly. Inspection rate is 400 to 500 parts per hour.

The gage consists of a feeding and gaging fixture and a three-column Precisionaire instrument. Mounted on the bench-type base are a vertical



**American Bosch PSB  
fuel injection pump  
for diesel engines.**

## Unmatched for service and performance...

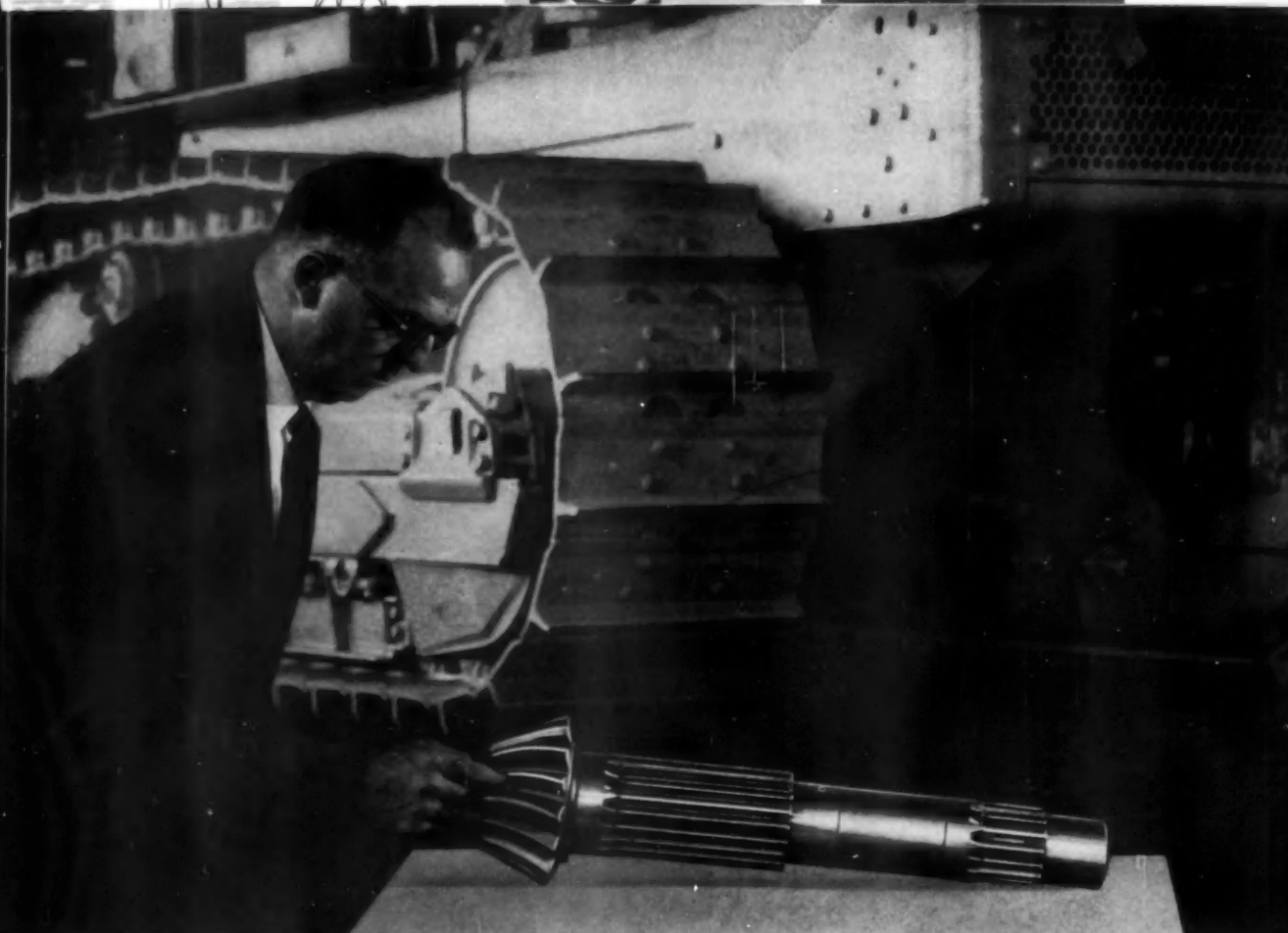
That's the record of more than 100,000 American Bosch PSB fuel injection pumps now in service—some for as long as five years. The PSB has many features—simple rugged construction, fewer parts, accurate fuel metering and distribution, positive governor control. Easily replaceable hydraulic head permits quick field servicing. All combine to assure top engine performance and economy of operation, long trouble-free life and low maintenance expense.

Every American Bosch fuel injection product is backed by an established and growing system of authorized service agencies, fully equipped and staffed with trained personnel to provide quick, efficient repair service.



## AMERICAN BOSCH

Division of  
American Bosch Arma Corporation  
Springfield 7, Mass., U. S. A.



Caterpillar Tractor Co. Metallurgist T. H. Spencer inspects final drive pinion for D9 crawler tractor weighing 28 tons. Severe loading of this large pinion requires a steel with high case and core hardenability. Several years ago

Caterpillar Tractor Co. found that simply by increasing the molybdenum content of AISI 8622 (to 0.30-0.40%), the desired properties were obtained at lower cost than was possible in any of the standard carburizing grades.

## Caterpillar Tractor Co. improves case and core hardenability of carburizing steel by increasing molybdenum content

"Drive pinions in tractors must take very high torque loads," says T. H. Spencer, Metallurgist for Caterpillar Tractor Co. "AISI 8622 steel, which we had been using, couldn't give us the hard case and strong, tough core we needed in these heavy sections. Other standard carburizing steels with the requisite properties would have cost substantially more. We found, however, that we could achieve the desired surface and core properties by simply modifying AISI 8622 with a higher percentage of molybdenum. We have been using this composition for several years, and results have been excellent."

Caterpillar Tractor Co.'s experience shows how increasing molybdenum in a carburizing steel helped to solve a specific problem. Perhaps your product, too, can benefit by higher molybdenum content.

A technical article, "New Carburizing Steels for Critical Gearing", describes some recent investigations of higher-moly carburizing steels. For a reprint, write Climax Molybdenum Company, Dept. 4, 500 Fifth Avenue, New York 36, N. Y.

# CLIMAX MOLYBDENUM



Use the  
Moly Key  
to better  
carburizing  
steels

- High case hardness
- Wide choice of hardenability
- Easy to heat treat
- Low distortion
- Good machinability
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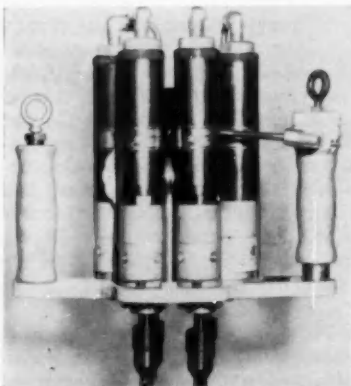
## New Production and Plant Equipment

(Continued from page 151)

### Multiple Drivers-Setters

**L**OW-TORQUE multiple screw drivers and nut setters are now available in a new line designed specifically for torques of less than 11 lb-ft. Two sizes of offset gear arrangements make allowable distances between bolt centers as low as  $1 \frac{3}{16}$  in. with standard parts. This feature is said to open new possibilities for multiple driving in the lower torque ranges. An offset attachment with a 2-to-1 gear ratio makes it possible to attain up to 27 lb-ft of torque from the nut setters.

Designed to provide optimum power in sturdy, small-diameter air motors, the five models of these tools offer 18 selections of motors. Tool speeds range from 225 to 2800 rpm; torques from 2.3 to 27 lb-ft. On-center or off-set direct drives are available for the nut setters. Screw drivers may use



Keller multiple nut setter for torques of less than 11 lb-ft

either drive coupled to the cushion clutch with a  $\frac{1}{4}$  in. axial float.

In the 2.3 to 11 lb-ft range of torque, the center-to-center distance for on-center motors is  $1 \frac{1}{4}$  in.;  $1 \frac{3}{16}$  in. for offset motors. Offset motors with the attachments to attain up to 27 lb-ft of torque, have a center-to-center distance of  $1 \frac{5}{16}$  in.

The one-piece head and motor housing provides remote control connections. The housing contains muffling facilities and a new deflector which directs the exhaust air from the lower end of the motor housing. Keller Tool Div., Gardner-Denver Co.

Circle 73 on postcard for more data

## ANGLE TOOLS? BUCKEYE builds all types!

**DRILLS** 90° Heavy-Duty  
360° Heavy-Duty 90° Close-Coupled  
30° Collet

### NEW

90° angle head nutrunners, reversible. Standard head illustrated; also available with short coupled head.

30° Chuck

**SCREWDRIVERS**

90° Chuck

### NEW

Short-coupled drills, screwdrivers, nutrunners, designed for working in areas where operating room is extremely limited.

90° Collet  
**NUTRUNNERS**  
90° Reversible

There's a Buckeye angle tool for every drilling and fastening job—including yours. No matter how special your requirements, you're sure to find a Buckeye angle tool exactly suited to your work. Choose from almost 500 types, models and speeds—all described in our Catalog A-10.

**Buckeye Tools**  
CORPORATION

DIVISION 21 • DAYTON 1, OHIO

producers of  
the world's first  
successful  
rotary air tools

## ON OUR WASHINGTON WIRE



The construction industry, already enjoying its biggest year in history, is headed for still higher peaks next year. Advance

reports on planned construction show that this year's total outlays for new building of about \$44 billion will rise by \$1 billion.

Government's money managers are finding that the higher cost of money is not putting any big dent in buying plans. Neither industrial expansion schedules nor individual consumer spending has slowed down appreciably as a result of the money squeeze recently triggered by the Federal Reserve Board.

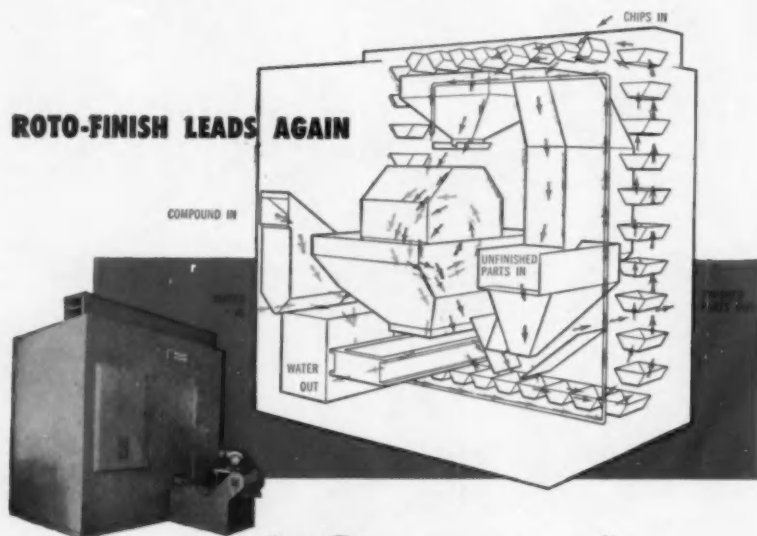
Motor vehicle registrations in the U. S. continue to gain and are expected to reach 65.275 million units for 1956, according to an estimate made by Bureau of Public Roads. Passenger cars will number 54.3 million, a 4.1 per cent increase over 1955. Trucks and buses are expected to total 10.975 million, a gain of 3.7 per cent.

Military assignments for standardizing items within specific classes of supplies, equipment, and weapons are listed in a new Defense Dept. directory. Copies of "A Directory of FSC Class Assignments to the Military Departments" are available from the Quartermaster Depot, Philadelphia, Pa.; Navy Supply Depot, Scotia, N. Y.; and Wright-Patterson Air Force Base, O.

Part of the burden of record-keeping piled on the American businessman by the Government would be removed by a new Federal program. The 10 executive departments and the independent agencies have been directed to find means of reducing the amount of records filing demanded of concerns handling Government business.

A report of findings of a panel of industry officials investigating possible use of high-strength precision castings, particularly of steel, in aircraft fabrication has been released. Copies of the report (PB 121148) "Precision Steel Castings for Aircraft Use" may be ordered at \$1.75 each from Office of Technical Services, Dept. of Commerce, Washington 25, D. C.

### ROTO-FINISH LEADS AGAIN



### the new "Rotomation" MACHINE MAKES MECHANICAL TUMBLING A FULLY AUTOMATIC BARREL FINISHING PROCESS

- Completely Automatic
- Needs no operator in attendance
- Loads and unloads itself with each cycle.
- Cycle variable for different part requirements.
- Provides continuous operation
- Assures uniformity of finish
- Low cost operation — high production
- Complete package unit
- Simple to install . . . Electric, water, air and drain connections only.
- Suitable for straight line production.
- Thus, "Rotomation" barrel finishing machine becomes a machine tool.

**Roto-Finish**  
3713 MILHAM ROAD, KALAMAZOO, MICH.



**COMPANY**  
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**Passenger cars**



**Trucks**



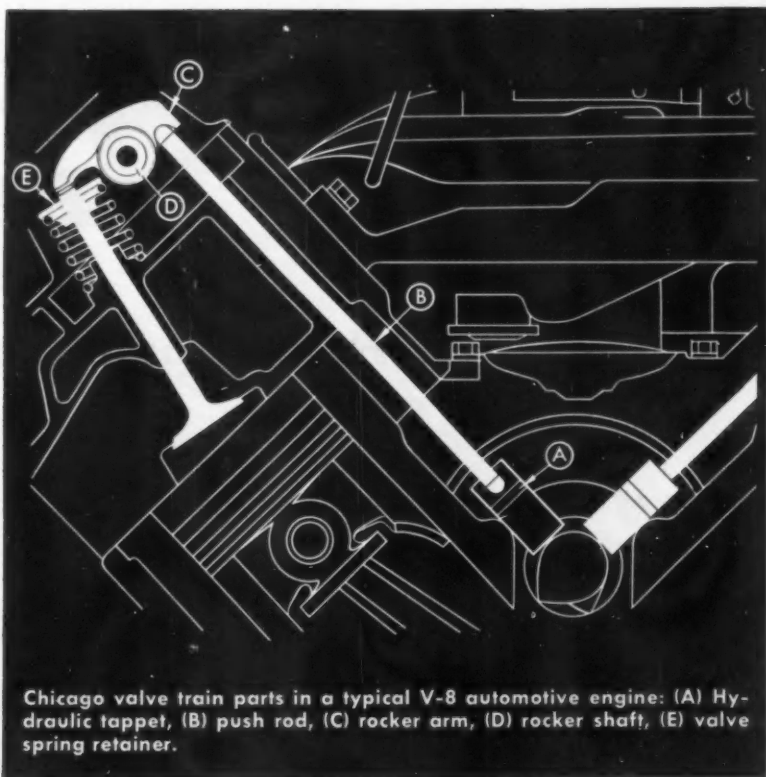
**Tractors**



**Diesels**



**Aircraft**



Chicago valve train parts in a typical V-8 automotive engine: (A) Hydraulic tappet, (B) push rod, (C) rocker arm, (D) rocker shaft, (E) valve spring retainer.

**When it comes to valve gear,  
leading engine makers come to**

# CHICAGO

Here at Chicago you'll find a single source for everything you need in valve gear. These specialized facilities are solving problems and saving money for leading engine manufacturers . . . and can do the same for you.

**Design and Engineering**—at Chicago you'll find valve gear engineering experience in depth . . . men who understand your problems and will work with your engineering staff in designing cam shafts and complete valve gear assemblies for any type of engine.

**Manufacturing**—Chicago is a leading manufacturer of valve train parts. Our complete line includes precision-made hydraulic and mechanical tappets; push rods in both lightweight tubular and solid styles; valve adjusting screws including new self-locking screws that cut assembly costs; valve spring retainers; rocker arms and rocker shafts.

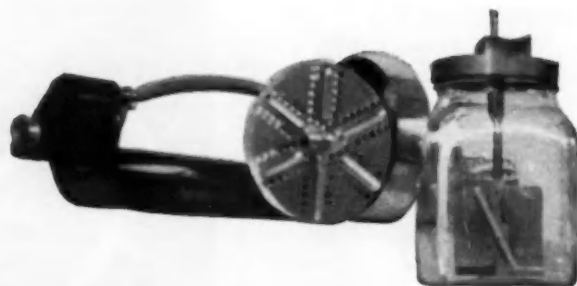
**Testing**—we have complete laboratory and engine testing facilities.

*For the full story of how we can serve you, write our Tappet Division.*

## THE CHICAGO SCREW COMPANY

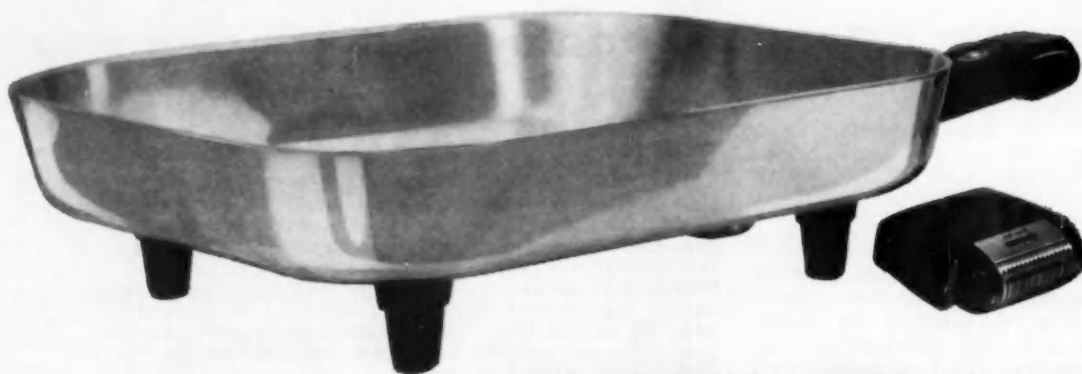
DIVISION OF STANDARD SCREW COMPANY • ESTABLISHED 1872

2801 WASHINGTON BOULEVARD, BELLWOOD, ILLINOIS



*Sunbeam*...Home Appliances...

## How Doehler-Jarvis die castings help produce high-quality products



### **Take a look at these Sunbeam Corporation Appliances.**

Every one has features made possible by die castings.

Notice the frypan . . . Three critical requirements were successfully met by Doehler-Jarvis. (1) A large and complex Calrod element is die-cast in exact position. (2) Metal cross sections are controlled to insure even heating across the pan. (3) A die-cast seal excludes wash water from the heating element.

The frypan is a highly successful die-cast product...millions having been produced to date.

In addition, Doehler-Jarvis makes parts for the



following Sunbeam appliances sold throughout the world:

Mixmaster, Jr.  
Mixmaster  
Men's Shaver  
Electric Drill  
Food Chopper  
Hedge Trimmer  
Slicer & Shredder

Butter Churn  
Clipmaster & Shearmaster  
Model "S" Sprinkler  
Blender  
21" Rotary Lawn Mower  
Egg Cooker  
Bench Grinder

Doehler-Jarvis, possessing the world's most extensive die-casting facilities, has met Sunbeam's large-volume requirements with the desired quality and service. We are proud of our long association with the Sunbeam Corporation.

Doehler-Jarvis Engineers, if anyone, can help you convert your product ideas into best sellers through die castings. Get in touch with them—now!

## Doehler-Jarvis

DIVISION OF NATIONAL LEAD COMPANY

General Offices: Toledo 1, Ohio

In Canada:

Barber Die Casting Co. Limited  
Hamilton, Ontario



# CASE HISTORY 1

## REQUIRED:

A dependable supply of this small, machined electrode to meet customer's quality and quantity needs at reduced cost.

## HASSALL SOLUTION:

Hassall-designed re-heading process, involving no critical dimension changes, resulted in a 59% cost reduction to customer.



# CASE HISTORY 36

## REQUIRED:

Less costly manufacturing method for this small stainless steel fluted pin which cost \$19.20 per M as a screw machine product.

## HASSALL SOLUTION:

Cold forming by Hassall at a cost of \$2.95 per M gave the customer an 85% cost reduction on this part.



# CASE HISTORY 89

## REQUIRED:

Customer looking for low cost, high production rate method of producing mandrels for rotary dental brushes.

## HASSALL SOLUTION:

Hassall-originated design for cold-heading replaced chamfered end with tumbled, round end; maintained rigid specifications for straightness and made low-cost production possible.



# CASE HISTORY 37

## REQUIRED:

Bumper bolt with bonded rubber cap for license plate support.

## HASSALL SOLUTION:

The large head on this bolt would ordinarily call for screw machining but the two lugs under the head ruled this out. Progressive cold-heading was Hassall's answer.



# SPECIALTY MANUFACTURER OFFERS SAVINGS ON SMALL PARTS AND FASTENERS

Multiply these case histories a thousandfold and you'll get some idea of the variety of tough problems we crack, and the savings we effect for our customers in the course of a year.

Our cold-heading process—supplemented by secondary operations—imposes amazingly few limitations on the parts and fasteners we can make. Don't forget that we are not limited to "stock" sizes. These illustrations show that Hassall—a specialty supplier—can show you substantial savings, better deliveries and technical assistance on your small parts and fasteners.

Proof? Send us your specifications or write for catalog.

John Hassall, Inc., P. O. Box 2194, Westbury, Long Island, New York.

# HASSALL

SINCE 1850



NAILS, RIVETS, SCREWS AND OTHER COLD-HEADED FASTENERS AND SPECIALTIES

# MEN in the NEWS

(Continued from page 41)



Automatic Transportation Co.—R. D. Jones has been appointed general sales manager.

Allis - Chalmers Mfg. Co.—W. J. Klein has been appointed vice-president and director of sales, and W. L. Voegeli has been appointed general sales manager for the Tractor Group.

Ross Gear and Tool Co.—William A. Blume has been elected a director.

Bendix Products Div., Bendix Aviation Corp.—Walter E. Schock was named an executive sales engineer.

Detroit Transmission Div., General Motors Corp.—Jack W. Qualman has been appointed assistant chief engineer.

George L. Nankervis Co.—Stanley R. Anderson was appointed controller.

Greer Hydraulics, Inc.—Jules Kendall has been named vice-president in charge of research and development.

B. F. Goodrich Tire Co.—C. Herman Behrle has been named manager of passenger tire sales, and Harry N. Roberts has been made manager of dealer sales for replacement tire sales.

Dayton Rubber Co.—L. J. Keyes is now director of purchases.

Aro Equipment Corp.—Chedo P. Graham has been promoted to chief engineer.

Baldwin - Lima - Hamilton Corp., Loewy - Hydropress Div.—Frederick A. Fielder has been made general sales manager.

(Turn to page 162, please)



Clearing Machine Corp.—Phillip Delmer was appointed manager of hydraulic press sales.

#### Heat-Treated Castings

Heat-treating facilities range from small batch type furnaces through continuous quench and temper furnaces to meet modern casting requirements.



#### Intricate Castings

CWC metallurgical engineering, control and mechanization provide the means to produce castings of the most intricate design.



## Here's how CWC meets grey iron, iron alloy and steel casting needs!

Six Campbell, Wyant and Cannon foundries, located in the heart of the Great Lakes industrial area, are fully equipped to produce the castings you need. Superior quality is maintained through exacting inspection and testing methods. Complete mechanization assures volume production at low cost and delivery on schedule. Look to CWC research engineering and facilities as your source for iron and steel castings. Write today . . . get your copy of the "One Source" booklet. It tells why CWC is the best source for many different casting requirements!

#### General Purpose Castings

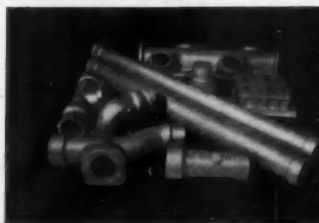
A large variety of general purpose castings are produced in the CWC foundries.

#### Steel Castings

CWC's extensive facilities make possible the production of over 150 tons of steel castings a day.

#### Castings With Special Properties

CWC's development of special purpose electric alloy irons for greater strength and resistance to wear, heat and corrosion helps cut machining time and costs.



**campbell  
wyant and  
cannon**

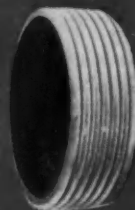
**FOUNDRY COMPANY**

Division of Textron Inc.  
Muskegon, Michigan

**CWC**

#### Centrifugal Castings

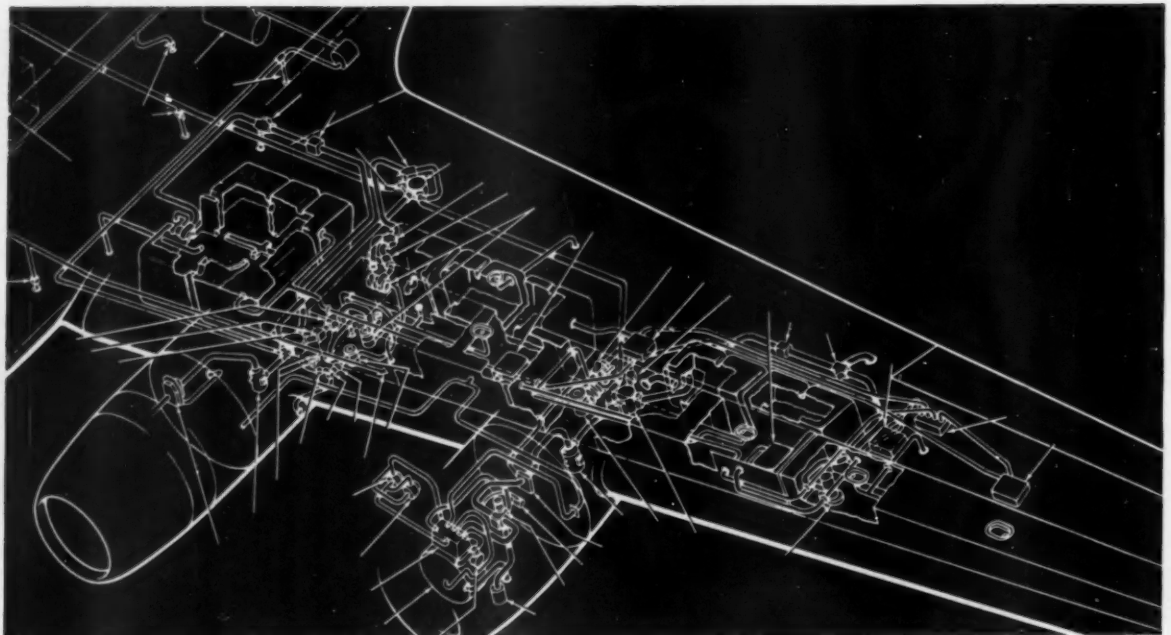
A pioneer in centrifugal casting, CWC alloys its own special metals in electric furnaces for proper uniformity in density and structure.



SIX FOUNDRIES LOCATED IN MUSKEGON, LANSING AND SOUTH HAVEN, MICHIGAN . . . READY TO SERVE YOU

# SUPERIOR TUBING

**BEST FOR 1001 AIRCRAFT APPLICATIONS**



A complex modern aircraft, as shown here, requires a wide variety of special-purpose tubing in many different sizes and alloys.

Superior can supply *all* your small metal tubing needs with premium quality tubing that meets all these requirements: light weight; close tolerances; workability; ability to withstand vibrations, shock, high temperatures,

and high pressure surges. Shown here are some of the many aircraft applications for tubing, the necessary qualities required of it, and the analyses in which Superior makes such tubing available.

## HYDRAULIC TUBING

Superior produces aircraft hydraulic tubing in a wide variety of sizes in stainless steel analyses AISI 304, 321 and 347. This tubing possesses a number of outstanding characteristics. It will withstand bursting pressures up to 12,000 psi. It is free from fissures, porosity, scratches and seams. It is clean and free of oxide film and metallic particles. It will flare without difficulty. This ductile, high strength, fatigue and corrosion resistant tubing will meet such rigid specifications as MILT 6845, MILT 8504, AMS 5565, 5566 and 5560. All tubing undergoes inspection for flareability, and is 100% hydrostatically tested.

## AIRCRAFT OIL LINES

This hydraulic tubing is produced by Superior in low carbon steel C-1008 to meet JIC and SAE standards, and Specifications AMS 5050E and ASTM A179. Low carbon content of 0.12% maximum gives high ductility for easy hand bending and flaring. This tubing is made from non-aging steel to prevent loss of ductility and impact resistance. All tubing is 100% hydrostatically tested at maximum working pressures, and all tubing has clean, smooth ID and OD surfaces to minimize pressure drop.

## AIRFRAME STRUCTURAL TUBING ENGINE MOUNTS (SMALL CRAFT)

Produced in C-1025 carbon steel to Specifications MILT 5066 and AMS 5075, this tubing has good welding properties. Also produced in 4130 alloy steel to Specifications MILT 6736 and AMS 6360, 6361 and 6362—can be hardened by heat treatment, and in annealed condition possesses good workability for flaring, bending, upsetting, etc., and has an excellent strength-weight factor.

## AIRCRAFT ENGINE PUSH RODS

Produced in 4130 alloy and 1035 medium carbon steel. Very smooth surface finish, extremely close tolerances, and controlled properties. Has very good strength-weight factor.

## DUCTING AND FUEL LINES

Large OD thin-wall tubing in Seamless or Weldrawn® grades is produced in a wide range of analyses and in sizes as large as 2½ in. OD with .025 in. wall maximum. Meets Military Specification 6737. Close tolerances, very light weight, clean, and extremely ductile. Large OD thin-wall tubing has many applications in modern aircraft. Available in long lengths—up to 30 feet.

## SPECIAL TITANIUM HYDRAULIC LINES

This tubing is produced from vacuum annealed, commercially pure titanium. Both flareless and flared fittings can be used. A full range of sizes up to 1¼ in. OD is available.

## IGNITION HARNESS

Tubing for this application is produced from stainless steel types 304, 321 and 347, plus Inconel and Inconel X. Easily fabricated, retains excellent properties at elevated temperatures, produced to very close tolerances.

## MANOMETER LINES AND PITOT TUBES

This mechanical hypodermic needle tubing is produced in austenitic chromium-nickel stainless steel in 27 standard gages, each in 3 standard wall thicknesses. Special hard-drawn temper for maximum hardness and flexibility, and bright, clean ID and OD surfaces.

## SPECIAL AIRCRAFT INSTRUMENT GAGE BOURDON TUBING

Available in beryllium copper, Monel, 4130 alloy steel, Type 304 and Type 316 stainless steel, and Ni-Span-C. It is fatigue and corrosion resistant with low hysteresis and high electrical conductivity.

## AIRCRAFT ANTENNAS

Tubing produced of beryllium copper has been used very successfully for radar antennas on small craft. It has unusually low hysteresis, high strength, and good electrical conductivity.

## FIRE DETECTION EQUIPMENT

Produced in stainless steel, Inconel and 42 Alloy. Tubing has extremely close tolerances and special surfaces.

## SPECIAL PURPOSE AIRCRAFT TUBING MATERIALS

Superior produces not only a wide variety of standard tubing, but also tubing considered a "specialty" in many other mills.

### Super Alloys

The first group comprises some of the super alloys from which Superior produces tubing to customer order. Tubing of all these analyses performs well under severe conditions, and has high strength and oxidation resistance above 1200°F. Applications include thrust chambers and fuel and control lines in guided missiles and rockets. (Any of these higher quality materials can be used in the lower classifications shown.)

Inconel X<sup>1</sup>  
\*Timken 16-25-6  
\*A-286  
\*S-816  
Type 310  
Type 316

\*Haynes 25<sup>2</sup>  
Hastelloy C<sup>2</sup>  
\*Hastelloy F<sup>2</sup>  
\*Hastelloy X<sup>2</sup>  
\*19-9DL

### Oxidation Resistance Materials

The analyses listed below primarily offer excellent oxidation resistance above 1200°F.

Type 309  
Type 347  
Type 321

Inconel<sup>1</sup>  
Nichrome V<sup>3</sup>  
Type 446

### General Purpose Materials

The following materials offer diverse advantages at temperatures up to 1000°F.

\*1722 A (S)  
T 5  
Type 430

Type 410  
Nickel  
Monel<sup>1</sup>

\*Materials marked with an asterisk are not normally carried in inventory, but can be obtained from supplier on customer order. For that reason, orders specifying these materials will take longer to fill.

1. Reg. TM International Nickel Co.
2. Reg. TM Haynes Stellite Co.
3. Reg. TM Driver Harris Co.

*Let Superior tubemanship and experience help you solve your aircraft tubing problems. Write Superior Tube Company, 2020 Germantown Ave., Norristown, Pa., for your free copy of Bulletin No. 40.*

# Superior Tube

The big name in small tubing

NORRISTOWN, PA.

*All analyses .010 in. to ¼ in. OD—certain analyses in light walls up to 2¼ in. OD*

West Coast: Pacific Tube Company • 5710 Smithway St., Los Angeles 22, Calif. • RAYmond 3-1331

# For **GEARS** to build AMERICA'S ROADS



GEARS, thousands of them, will go into the construction machinery needed for our nationwide program of building highways and roads. An increasing number of these will be Fairfield Gears. Already one of America's largest independent producers, Fairfield's facilities are being further enlarged this year with approximately one hundred percent more space in heat treating and thirty-three percent more space for machine installations.

If you use gears in the product you make, we believe it will pay you, as it has others, to become acquainted with FAIRFIELD—the place where fine gears and differentials are produced to meet your specifications EFFICIENTLY, ECONOMICALLY! Your inquiry will receive prompt attention.

## FAIRFIELD MANUFACTURING CO.

2303 S. Concord Rd.

Lafayette, Indiana



*Fine Gears*

*Made to Order*

TRACTORS • CONSTRUCTION MACHINERY • ENGINES • BUSES • FARM IMPLEMENTS • MINING MACHINERY  
DIESEL LOCOMOTIVES • MACHINE TOOLS • AIRPLANES • HEAVY DUTY TRUCKS • OIL FIELD EQUIPMENT

## MEN in the NEWS

(Continued from page 158)

Carter Carburetor Div., ACF Industries, Inc.—Charles E. Heitman, Jr., has been appointed president.



Pratt & Whitney Co.,—Gage Div.—William C. Mullin has been named sales manager for instrument gages.

Vickers, Inc.—Louis G. Jordan has been named assistant chief engineer for industrial products; Carl A. Brown, assistant chief engineer for automation systems; R. H. Hallman, assistant chief engineer in charge of design, development, and test of hydraulic products for passenger cars and light trucks; Glenn M. Jones, assistant chief engineer for earth-moving equipment, heavy trucks, and buses; and Clare E. Hellenberg, assistant chief engineer for farm and materials handling equipment.

Square D Co.—Wilbur H. Peter, Jr., has been named vice-president.

Chandler-Evans Div., Pratt & Whitney Co., Inc.—William B. Gurney has been named manager of West Coast engineering and sales.

National Automotive Fibers, Inc.—Paul V. Shields has been elected chairman of the board.

Shalco Engineering Corp.—Herbert von Wolff has become general sales manager and vice-president.

Hercules Motors Corp.—J. L. Biasetti has been named an executive engineer.

Cook Electric Co.—William H. Miller and James E. Enright were made vice-president in charge of manufacturing and assistant treasurer, respectively.

Rigidized Metals Corp.—Welling W. Adams has been named western regional sales manager.

(Turn to page 164, please)

Baker-Raulang Co.—Ralph C. Reinhart has been named director of manufacturing.



# 65° BELOW ZERO!



## MILITARY WINTERIZING

Vehicles which will operate dependably in way-below-zero temperatures are being demanded more and more by government services. Engines and batteries must meet the test of 65°-below-zero starting and operation. Cabs must amply protect vehicle drivers, windshields and windows must defrost completely.

To help you provide tractors and trucks which meet the test, Allen offers a wealth of experience in engineering and supplying adaptations which make — 65° starting and operation possible.

Full information about Allen Winterization Service is yours for the asking. Just mail the handy coupon or telephone WOODWARD 2-8578.



**ALLEN INDUSTRIAL  
PRODUCTS, INC.**

**BATTLE CREEK, MICH.**

WOODWARD 2-8578

America's foremost designers and builders of cabs for construction machinery and industrial trucks—shovels and snow plows for industrial trucks.



**ALLEN INDUSTRIAL PRODUCTS, INC.**  
**LIBERTY STREET, BATTLE CREEK, MICH.**

- ☐ Send data on military winterization  
☐ Send representative

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

## MEN in the NEWS

(Continued from page 162)

Allegheny Ludlum Steel Corp.—**F. Price Norris, Jr.**, was made assistant to the vice president in charge of sales, on special assignments; **C. R. Mitchell, Jr.**, director of sales, stainless and specialty steels; and **Richard D. Mercer**, as assistant to the director of sales, stainless and specialty steels,

assigned to sheet and strip duties.

Westinghouse Electric Corp.—**C. J. Burke** was promoted to sales manager, and **E. J. Fogel** was advanced to manufacturing manager of the Industrial Gas Turbine Dept.

GMC Truck and Coach Div., General Motors Corp.—**Robert C. Kennedy** is now production liaison engineer.

G. S. Blakeslee & Co.—**Gale Blakeslee** has been elected president.

H. K. Porter Co., Inc.—**Allen M. Harrelson** has been named vice-president and treasurer.

Gear Grinding Machine Co.—**William F. Wilson** was named executive vice-president.



Republic Aviation Corp.—**Alexander Kartveli** has been appointed vice-president in charge of research and development; **Richard G. Bowman**, chief engineer in charge of production and experimental engineering; and **William O'Donnell**, chief engineer in charge of aircraft and missile development.

AC Spark Plug Div., General Motors Corp.—**J. Patrick Kane** is now sales promotion manager; **Roy L. Bowers**, staff engineer; **John R. Church**, aviation sales coordinator; **Edward J. Brandl** and **Matthew Parker, Jr.**, product merchandisers; and **Donald A. Foley**, aviation sales engineer.

Republic Aviation Corp., Guided Missiles Div.—**Karl D. Swartzel** has been appointed chief research and development engineer.

E. W. Bliss Co., Die Supply Div.—**M. E. Dorman** is now manager of dealer and accessory sales.

Leeds & Northrup Co.—**Thomas C. Smith** has been named chief application engineer.

Bendix Aviation Corp., York (Pa.) Div.—**K. F. Umpleby** was promoted to assistant to the general manager and **W. H. Sims, Jr.** was chosen chief engineer.

McDonnell Aircraft Corp.—**William B. Haylon** has been appointed manager of public relations.

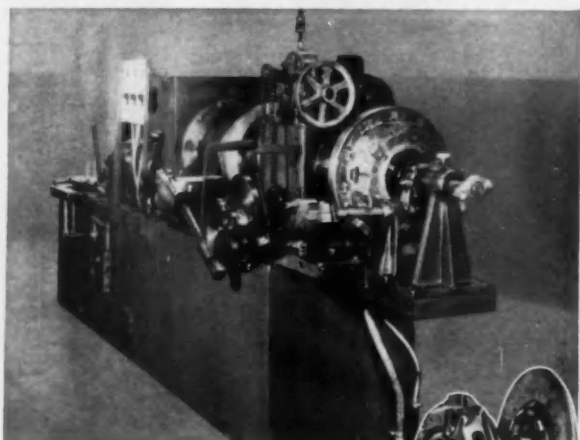
General Electric Co.—**Bernard F. Brehl, Jr.** has been chosen manager of industrial laminate sales for the Laminated and Insulating Products Dept.

Illinois Tool Works — **Donald P. Ridgeway** has become manager of the Spiroid Dept.

Erie Foundry Co.—**George Bricmont** has been appointed advertising manager.

Curtiss-Wright Corp., Metals Processing Div.—**Paul J. Chaney** has been appointed commercial products sales manager.

# ROCKFORD



## Thoroughly Tests ROCKFORD CLUTCH Facing Materials

To record the durability and heat resistance of current and newly developed friction material, for ROCKFORD CLUTCHES, two driven-member assemblies are assembled with two flywheels and clutch cover assemblies.

The automatic rotating cams of the engaging device produce repetitive engaging and disengaging cycles of the driving clutch and braking clutch assemblies. 10,000 engagements and disengagements, four cycles per minute, give a very conclusive wear test on the friction facings. The repetition and standardization of this test procedure constitute an accurate analysis of the wearing quality of friction facing materials used in ROCKFORD CLUTCHES.

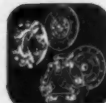
Let ROCKFORD engineers utilize this testing machine to insure the stamina of the clutch facing material in your products.

## ROCKFORD Clutch Division BORG-WARNER

315 Catherine St., Rockford, Ill., U.S.A.

Export Sales: Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

# CLUTCHES





## How Great Lakes Steel *launches* quality

You're at 400 feet, banking for a good close look at the unloading operation of the *Ernest T. Weir*. She's packed to the gunwales, stem to stern, with ore—tons of iron-bearing food for Great Lakes hungry blast furnaces.

What's this got to do with turning out top-quality steel at Great Lakes? Plenty! For quality pig iron can only come from quality raw materials—like the *Weir's* rich cargo. And, of course, quality pig iron is the very backbone of top-quality steel.

Control of quality at Great Lakes begins right at the mines. In fact, each ore source is picked with painstaking care. Then, repeated checks in the mines—*double checks* here at the unloading docks—put the quality of Great Lakes raw materials beyond question!

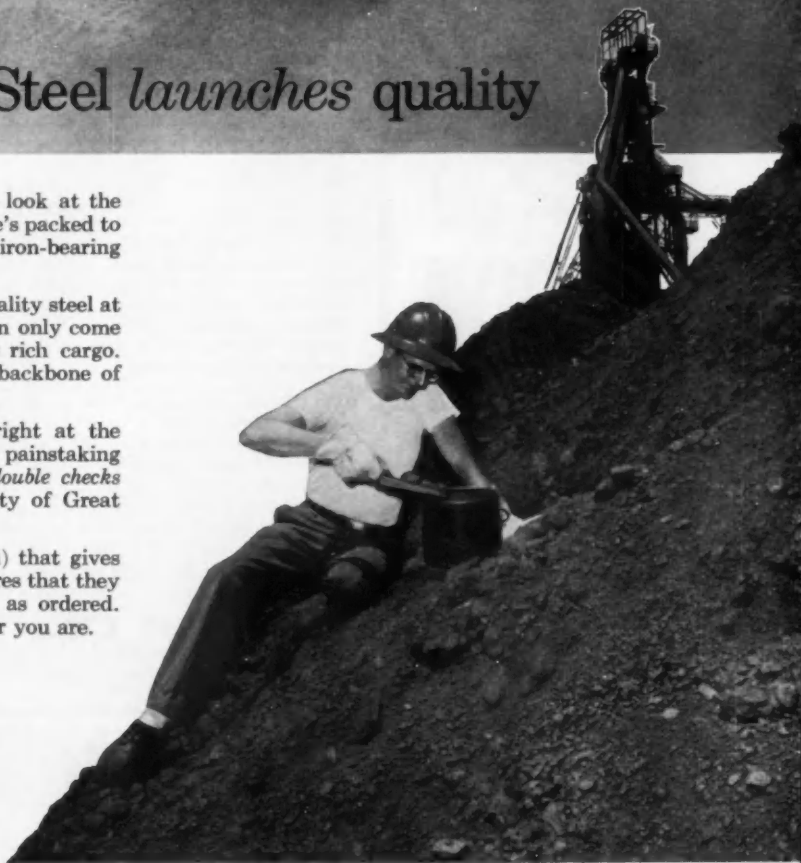
It's that kind of control (from start to finish) that gives our flat-rolled products uniform quality—assures that they will reach our customers exactly when and as ordered. We're ready to talk your steel needs whenever you are.

### GREAT LAKES STEEL CORPORATION

Detroit 29, Michigan • A Unit of



District Sales Offices: Boston, Chicago, Cincinnati, Cleveland, Grand Rapids, Houston, Indianapolis, Lansing, Los Angeles, New York City, Philadelphia, Pittsburgh, Rochester, St. Louis, San Francisco, Toledo, Toronto.



TO ASSURE TOP-QUALITY OPEN-HEARTH STEEL . . . iron ore (shown stockpiled here), coal and limestone—all of known source and quality—are sampled and tested over and over again by Great Lakes Steel raw material analysts.

# ORCHARD VPI

prevents rust

on

Borg-Warner



## SHIPMENTS TO EUROPE



Borg-Warner International Corporation, Chicago, Illinois, ships transmissions to Europe for use in Mercedes-Benz, Jaguar, and other foreign cars. Wrapping and packaging for overseas shipments is done in the four simple steps illustrated. The use of Orchard VPI paper prevents rust and corrosion, and helps provide the complete protection that keeps Borg-Warner transmissions in perfect condition for two years or more.

Orchard VPI paper is scientifically manufactured to give off an invisible vapor that prevents rust on all ferrous metal parts and products. It is economical and easy to use for packaging, for shipping, and for storage. It saves time and delivers parts in a rust-free condition ready for resale or installation. Orchard VPI is available in sheets, rolls, bags and shrouds—all shapes and sizes to fit your needs.

This four-step packaging for Borg-Warner Shipment was designed, engineered, and performed by Jerome F. Gould Corporation, export packers of Brooklyn, New York and Detroit, Michigan. VPI paper was purchased through Mid-West Paper Products Company, Detroit. Mid-West Representatives: R. M. Reutlinger & Assoc., Dayton, Ohio; Protective Packaging Co., Chicago, Illinois.

### ORCHARD PAPER CO.

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Write for free VPI samples  
and brochure. No Obligation



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3914 N. Union, St. Louis 15, Mo.

Please send us the Orchard VPI Sample Kit

Firm \_\_\_\_\_

Requested by \_\_\_\_\_

Address \_\_\_\_\_

City and State \_\_\_\_\_



(Continued from page 37)

Norton Co. has created three new divisions in a recent reorganization. They are: the Abrasive Div.; the Refractories Div.; and the Electro-Chemical Div.

Westinghouse Research Laboratories plans to add a new nuclear research reactor to its scientific facilities.

Navy has awarded a contract to North American Aviation, Inc., for research and development of a supersonic attack weapon, designated the A3J.

Industrial Reactor Laboratories, Inc., is name of new company formed by 10 large corporations to build and operate a privately owned nuclear reactor for industrial research in atomic energy, at Plainsboro, N. J. . . . Malleable Research & Development Foundation is name of new organization formed to promote technical progress in the foundry industry.

U. S. Industrial Chemicals Co. will put into operation by the end of 1957 a new plant for the production of high-quality titanium sponge.

Chevrolet has completed final plans for construction of a new major supply depot and zone office in Doraville, Ga.

Borg-Warner Corp. has developed an electro-mechanical manipulator for use with 3-D television for the fully remote handling of radio-active and other dangerous materials.

Piasecki Aircraft Corp. has launched negotiations for representations and cross licensing of aeronautical products with several European aircraft manufacturers.

Navy's Bureau of Yards and Docks will sponsor a symposium on Preservation for Mobilization Requirements at the U. S. Naval Civil Engineering Research and Evaluation Laboratory, Port Hueneme, Calif., on Oct. 23, 24, 25.

(Turn to page 168, please)

# RIGHT ARM of industrial research

Sanborn's galvanometer writing arms record valuable data to help solve the countless measurement problems of research, design, and production testing.

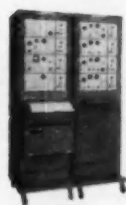
**S**INGLE to 8-channel inkless and permanent recording in true rectangular coordinates of 0-100 cps phenomena — ranging from telemetered aircraft data to atomic reactor characteristics — is the vital and growing role of Sanborn oscillographic recording systems in industry. The Sanborn file of users indicates that such recordings are aiding in the dynamic analysis of jet engine starters, machine tools, agricultural machinery and oil drilling equipment; performance of pilotless target aircraft, modern submarines and tracking radar systems; and the production testing of servo components, valve positioners and precision potentiometers. Sanborn systems designed especially for recording analog computer output extend applications further — in simulated flight set-ups, solution of complex problems with six or eight variables, etc.

The advantages of making Sanborn equipment the "right arm" of your recording problems include extreme *flexibility*, by means of a dozen different interchangeable, plug-in "150 Series" preamplifiers which quickly and economically adapt a basic system to changing requirements; choice of 1-, 2-, 4-, 6- or 8-channel systems, in vertical mobile cabinets or "portably packaged"; numerous chart speeds, many individual channel controls, and high over-all system linearity.

To see how oscillographic recording the Sanborn way can become the "Right Arm" of your analysis work, write for detailed information or contact your Sanborn Representative. Sixteen-page "150 System" catalog on request.

## SANBORN COMPANY

Industrial Division, Cambridge 39, Mass.



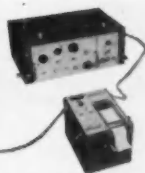
8-, 6- CHANNEL



4-CHANNEL



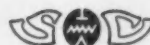
2-CHANNEL

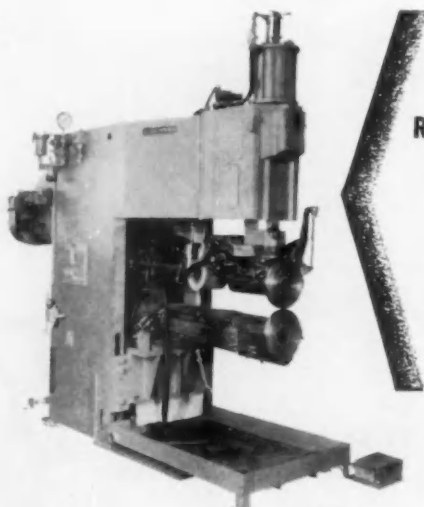


1-CHANNEL



2-, 4-, 6-, 8-CHANNEL  
ANALOG COMPUTER SYSTEMS



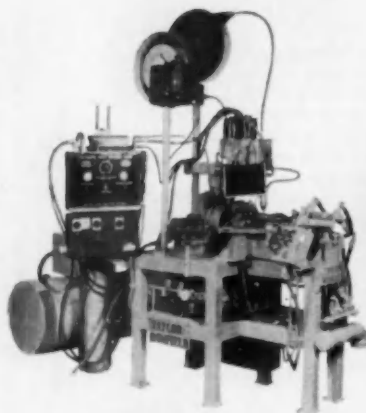
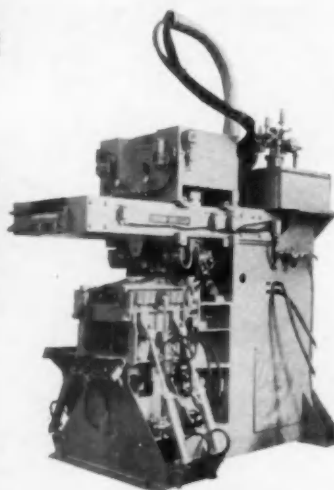


## STANDARD RESISTANCE WELDERS

Efficient, versatile for all basic uses; low operating cost, prompt delivery, long service life. T-W manufactures a complete line of resistance welder equipment—spot, seam, projection and flash-butt.

## SPECIAL RESISTANCE WELDERS

Resistance welders specifically designed for your work—most efficient production, including mechanical features, such as feed, handling, discharge, bending, forming or machining.



## SPECIAL ARC WELDERS

Custom designed for arc-welding assemblies on a production basis. All modern welding methods and equipment are incorporated. T-W are specialists in production line techniques.



**TAYLOR-WINFIELD Corporation**  
WARREN, OHIO

**ELECTRIC RESISTANCE AND ARC WELDING MACHINES**

*Sales and Service*

CHARLOTTE • CHATTANOOGA • CHICAGO • CLEVELAND • DALLAS  
DAYTON • DENVER • DETROIT • LOS ANGELES • PHILADELPHIA  
PORTLAND, OREGON • SEATTLE • ST. LOUIS • STAMFORD  
OAKVILLE AND WINDSOR, ONTARIO



(Continued from page 166)

Olin Mathieson Chemical Corp. and Revere Copper and Brass, Inc., have formed a jointly owned \$231 million company to produce 180,000 tons a year of primary aluminum.

\* \* \*

Bristol Aero-Engines, Ltd., has revealed that the Bristol Olympus BO1.6 turbojet engine develops 16,000 lb thrust without reheat and exceeds by 4000 lb the power of the earlier BO1.11.

\* \* \*

Cornell Aeronautical Laboratory is developing new research equipment to probe the problems connected with space flight.

\* \* \*

Vanadium Corp. of America has transferred its Engineering Dept. to new facilities at Cambridge, O. . . White Motor Co. has moved its New York regional offices to the 415 Madison Ave. Bldg.

\* \* \*

Wagner Electric Corp. has released a new film showing progressive steps in the manufacture of power and distribution transformers.

\* \* \*

Climax Molybdenum Co. has announced price cuts of about 30 per cent on molybdenum-base alloy and price increases of about 20 per cent on pure metallic molybdenum.

\* \* \*

Reynolds Metals Co. is acquiring 1500 acres of land near Massena, N. Y., for a proposed aluminum reduction plant.

\* \* \*

Fiat of Italy will set up a plant in Mexico City for marine engine manufacture.

\* \* \*

Hamilton Standard Div. of United Aircraft Corp. has established an Electronics Dept. . . ACF Industries, Inc., has established a Missiles Group.

\* \* \*

British Motor Corp. has doubled the warranty period on new cars and export commercial vehicles.

\* \* \*

L. A. Young Spring & Wire Corp. has purchased the assets of Gonset Co., Inc., Burbank, Calif.

(Turn to page 170, please)



## There's magic in the words, "STAINLESS STEEL"

For many years, the man in the street didn't know Stainless Steel from tinplate.

But today, he buys staggering quantities of Stainless Steel tableware, kitchen utensils and gadgets. There's a good chance that his Stainless Steel pots and pans are washed in a Stainless Steel sink. He knows that Stainless Steel is hard and strong, handsome in appearance and corrosion resistant.

Aren't these perfect selling points for Stainless Steel automotive trim? Your dealer can point out that *this* solid trim will not flake or stain. He can mention that Stainless Steel is remarkably strong and will withstand blows that would cause less sturdy materials to cave in.

These aren't the most important features in the world, but they make it easier to sell cars.

There's a USS Stainless Steel type and finish for every need.

UNITED STATES STEEL CORPORATION, PITTSBURGH  
AMERICAN STEEL & WIRE DIVISION, CLEVELAND  
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO  
NATIONAL TUBE DIVISION, PITTSBURGH  
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.  
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS  
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

SHEETS • STRIP • PLATES • BARS • BILLETS  
PIPE • TUBES • WIRE • SPECIAL SECTIONS

# USS STAINLESS STEEL



SEE THE UNITED STATES STEEL HOUR. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.



UNITED STATES STEEL



(Continued from page 168)

Martin Co. has awarded a sizeable contract to Westinghouse Electric Corp. for two wind tunnel drives.

Hyster Co. plans to open a new tractor equipment assembly plant near Glasgow, Scotland.

\* \* \*

North American Aviation, Inc., will construct a facility for production flight test operations at the Air Force Palmdale, Calif., airport.

\* \* \*

Hercules Powder Co. and Imperial Chemical Industries, Ltd., will build an \$11 million plant to make methyl methacrylate at Louisiana, Mo.

Army Corps of Engineers has developed a new high-temperature resistant paint. Designed primarily for field application for the protection of Diesel engine exhaust systems, it has proved to be even more satisfactory for plant applications.

\* \* \*

New York City now holds top place among the cities considered for the new Engineering Societies Center.

\* \* \*

Aero Supply Mfg. Co., Inc., has formed an aircraft engine components section.

\* \* \*

Titeflex, Inc., has completed consolidation of its facilities at Springfield, Mass.

\* \* \*

Engineers Joint Council, 29 W. 39th St., New York 18, N. Y., has published a report entitled "Raising Professional Standards and Improving Employment Conditions for Engineers."

\* \* \*

Michigan Chrome and Chemical Co. has acquired the assets of Pyramid Plastics Co. . . . Acme Steel Co. has agreed to purchase the net assets of Newport Steel Corp.

\* \* \*

Industrial Tectonics, Inc., is building a new Western Div. plant in Compton, Calif., to manufacture precision anti-friction bearings.

\* \* \*

Dow Chemical Co. has launched another major expansion program of over \$75 million. . . . Swedish Crucible Steel Co. has completed a \$1 million expansion program.

\* \* \*

Huber-Warco Co. has announced the addition of Cummins Diesel-powered units to its line of 6-D and 7-D series motor graders with torque converter and full power shift transmission.

\* \* \*

A. Montero y Cia. S. A. and Harnischfeger International Corp. have formed a company in Santiago, Chile, to make welding electrodes.

\* \* \*

The nation's first pilot plant for disposing of steel plant waste acid by the Blaw-Knox Ruthner process was unveiled at Niles, O., on Sept. 17.

\* \* \*

Fruehauf Trailer Co. of Canada, Ltd., plans to build a new \$3 million plant near Toronto, Ont.

# BURR-MASTER

## For Every Gear Deburring Job

You can't afford obsolete methods when Burr-Masters can "deburr and chamfer" gears and splines up to 300 teeth per minute!

Universal machines for internal gear and spline deburring. Data in Bulletin 103-81.

Hypoid pinion deburring machines are available in single or multiple station models. Data in Bulletin 103-100.

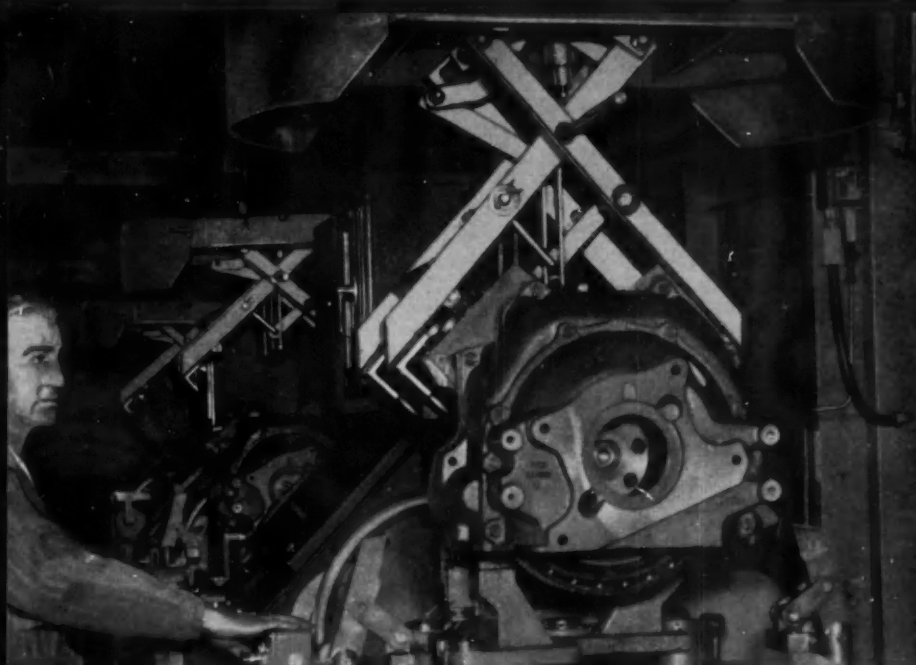
Eight Universal models, single or two station, deburr and chamfer spur or helical gears and external splines. Get complete data in Bulletin 103-60.

# MODERN®

14230 BIRWOOD AVE.

Industrial Engineering Co.

DETROIT 38, MICHIGAN



Over 100 pairs of Heppenstall Safe-T-Tongs are carried by a modern power-and-free conveyor on a prominent automobile producer's assembly line. They pick up partially assembled engine blocks and deliver them to machines which drill their crankshaft area. Next, the tongs lift the blocks and transport them to the following operation.

## Heppenstall automatic Safe-T-Tongs, custom built to your individual needs, speed handling, eliminate safety hazards

Heppenstall's fully-automatic Safe-T-Tongs are today's answer to many difficult material handling problems encountered in "automated" production set-ups. Requiring no power, they operate merely by being lowered on the burden to be lifted. They go through their entire cycle of automatic operation quickly, safely, accurately and efficiently.

Safe-T-Tongs are also widely used in the automotive industry where individual lifts of materials are handled by hoist or crane. They do not require any rigging or chains on the load to be lifted, nor ground chainmen — thus eliminating potential safety hazards. Your crane operator does the entire job, either from his cab or by remote control.

Whatever your particular handling jobs require — regardless of shapes, weights or sizes — Heppenstall tongs, engineered specially to your individual needs, will help you economically speed materials handling operations with greater efficiency and safety.

For complete information and technical assistance contact Heppenstall Company, New Brighton, Pa. Sales offices and representatives are located in principal industrial centers.



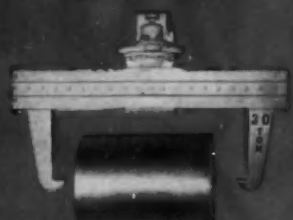
... tongs for every automotive lifting problem



Cast Double "C" Hook



Single "C" Hook



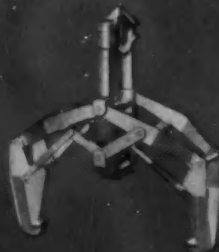
Motorized Rotating Horizontal Coil Tong



Single Vertical Coil Tong



Motorized Rotating Crane Hook



Motorized Horizontal Coil Tong



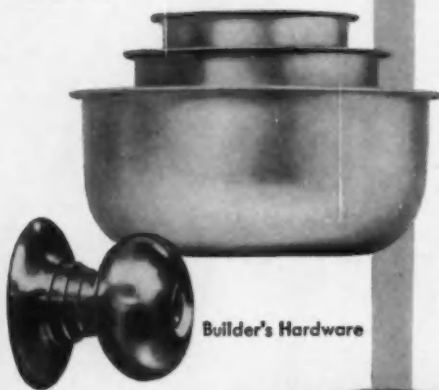
Back and Pinion Horizontal Coil Tong capable of handling coil widths from 19 1/2 to 32 inches



Motorized and Manually Operated Sheet Lifters



Housewares



Builder's Hardware



Appliances



Hospital, Institutional and Restaurant Equipment

**Look what they're  
designing and  
fabricating from  
the New 200 Series  
Stainless Steels**



Truck Trailers



Domestic and Industrial Sinks

# REPUBLIC



*World's Widest Range of Standard Steels*



Automotive Parts and Trim

Favorable reports on the fabrication of A.I.S.I. Types 201 and 202 are flowing in from manufacturers of a wide variety of stainless steel products ranging from sinks and housewares to hub caps and trailer trucks.

These reports clearly indicate that the 200 series can be fabricated on present equipment without difficulty—without any additional investment in tooling, in most cases. And possibly at savings in certain operations. In fact, skilled equipment operators—the men who work with stainless day after day—have been unable to distinguish between the 200 series and other types when they were intermixed in production runs.

The 200 series is a relatively new member of the family of Republic ENDURO® Stainless Steels. It offers high strength, corrosion-resistance, and easy

formability, including draw-bench forming, roll forming, brake bending, blanking, stamping, embossing, trimming, deep and shallow drawing, welding.

Consideration of 201 and 202 for design and fabrication of your present or projected items should be based on the merits of these two types and not as alternates for other grades. However, they are being used interchangeably with other grades.

Our booklet, No. 735, has the latest information on the properties, test evaluations and potentials of these new austenitic stainless steels containing 17% Cr—4% Ni—6% Mn and 18% Cr—5% Ni—8% Mn. Republic Stainless Steel metallurgists and specialists are ready to help you apply Types 201 and 202 to your production. There's no obligation. Just send the coupon to let us know if you would like a representative to call at your plant.

# STEEL

*and Steel Products*

## REPUBLIC STEEL CORPORATION

Dept. C-2518  
3106 East 45th Street  
Cleveland 27, Ohio

- ☐ Send Republic Booklet No. 735 on 200 Series.  
☐ Have a Stainless Steel Metallurgist call.

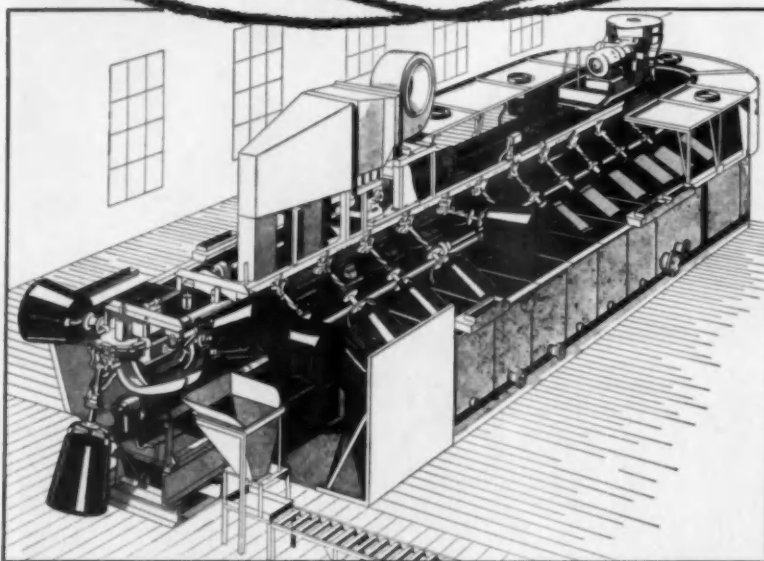
Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

## Barrel Plating by Stevens Really Cuts Costs



End View of Stevens Super "E" Automatic Barrel Plating Machine.

Since Stevens first introduced the Automatic Barrel machine scores of industries have enjoyed these operational advantages. Check them against your present operations.

**MINIMUM LABOR REQUIRED** — In most cases, one unskilled employee can operate the machine.

**HANDLES THE COMPLETE CYCLE** — Including cleaning, pickling, chromate treatments, plating, bright dip and drying.

**COMPLETELY AUTOMATIC** — No barrel lids to fasten and unfasten during automatic loading and unloading.

**BETTER HANDLING** — No mixing of parts. Becomes a part of a straight line production system.

**NO HEALTH HAZARD** — Occupational health hazards eliminated with ventilation of equipment.

**UNIFORMITY OF PLATE** — Accurate plating cycles timed to meet your requirements.

**FITS ANY PLANT LOCATION** — Does not need special buildings—Can be moved at any time. Low head room.

**DEPENDABLE** — Scores of machines in use. Machine design and construction constantly improved.

**LOW INITIAL COSTS** — For average operation lowest initial machine costs.

**LOW MAINTENANCE COSTS** — Proven over years of use and in varied operations.



Let a Stevens Sales Engineer show you how you can cut costs in your plating operation with a Stevens Automatic Barrel. Write us direct. Frederic B. Stevens, Inc., 1816-18th Street, Detroit 16, Michigan.

**METAL FINISHING EQUIPMENT AND SUPPLIES, FROM CASTINGS OR STAMPINGS TO FINISHED PRODUCT**

BRANCHES:

Buffalo • Indianapolis • New Haven  
Offices in Principal Cities

## Industry News

(Continued from page 94)

### Radiator Parts of Stainless Steel Used in Some 1957 Cars

Some of the new 1957 cars will have radiators with stainless steel parts to mark the first time in automotive history that the metal will be used for such applications. After four years of intensive research, it has been proved that the top and bottom tanks and baffle plate can now successfully be made of stainless steel.

A joint announcement concerning stainless steel for use in radiators was made by McCord Corp., pioneer radiator manufacturer, and Allegheny Ludlum Steel Corp., leading producer of stainless steel. These two organizations cooperated on the stainless steel radiator research and development project.

For each radiator whose components will be made of stainless steel, approximately two lb of the shiny metal will be used. At the present time, one major manufacturer has allotted 10 per cent of the production of one car to be made using stainless steel radiator parts.

The outlook for the 1958 car models is even better. In 1955, there were about 10 million automotive radiators made.

The new radiator parts are made of type 430 stainless steel, which is a straight chromium grade. There is no nickel used in this type stainless steel.

### Divco Shareholders to Vote On Wayne Works Acquisition

If Divco Corp. shareholders approve the acquisition of Wayne Works, Inc., Richmond, Ind., the name of the company will be changed to Divco-Wayne Corp. A shareholder's meeting on the proposal to acquire the Indiana company will be held Oct. 24 in Detroit.

### Erratum

It was stated in the "Men in the News" section (page 41) of the Sept. 15 issue of AUTOMOTIVE INDUSTRIES that Jack J. Gray had been named superintendent of manufacturing services for Temco Aircraft Corp. The item should have specified that he was appointed to this position at Temco's Garland, Tex., plant, not the main Dallas plant.



## why stainless puts a gleam in a buyer's eye

Folks *know* that only *stainless* keeps its new look and bright beauty for a lifetime. They know it needs almost no care . . . how it cannot pit, chip or peel . . . how it fights rust and corrosion. They *know* because they choose stainless for everything from table service to garden tools.

It's why stainless naturally puts a gleam in a buyer's eye when it's used from front bumper

to tail light on the car you'd like to sell him.

And stainless is tops, too, from your point of view. It's easy to fabricate . . . comes in a wide variety of grades and finishes . . . and requires no protective coating. Your Crucible representative can give you further details. See him soon. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

**CRUCIBLE**

first name in special purpose steels

**Crucible Steel Company of America**

Canadian Distributor—Railway & Power Engineering Corp., Ltd.



Photo courtesy of Caterpillar Tractor Co., Peoria, Ill.

it's only part of the HTM\* story...

## STRENGTH

High ultimate strength of HTM castings helps the famous Cat D7 Tractor do the tough jobs day-in and day-out. Vital parts, such as the front idler adjusting nut shown, are made from HTM metal . . . the metal with the high ultimate strength that resists wear and fatigue under heavy loads.

And there are lots of other "plus" advantages in HTM castings. For example, they possess excellent non-seizing properties . . . can be either liquid or air-quenched . . . can be given a smooth finish. Perhaps *most important of all*, HTM machinability index ranges from 80 to 90 (B1112 steel=100).

HTM castings can often reduce manufacturing costs, weight and assembly time . . . can increase quality and sales potential of your product. AA-5746-A

\*HTM—High Tensile (Heat-Treated) Malleable

**NATIONAL MALLEABLE and STEEL CASTINGS COMPANY**

Established 1868 • Cleveland 6, Ohio

the nation's largest independent producer of malleable and pearlitic malleable

## News of the MACHINERY INDUSTRIES

(Continued from page 79)

At the time of his retirement Mr. d'Arcambal will relinquish his position as chairman of the board of Potter & Johnston Company, Pawtucket, R. I., a Pratt & Whitney subsidiary, and will be succeeded in that position also by Mr. Gillane, formerly president of Potter & Johnston.

### New MED Director

The appointment of J. Robert Jones, vice president in charge of sales, Kearney & Trecker Corp., Milwaukee, Wis., as director of the Metalworking Equipment Div., Business and Defense Services Administration, U. S. Department of Commerce, has been announced by BDSA Administrator Charles F. Honeywell.

### Shorts on Machines

The National Machine Tool Builders' Association has released a list of 123 motion picture films on machine tools produced by member companies. A majority of the films are in color and showing time ranges from 10 min. to 40 min.

## British Motor Show

(Continued from page 61)

sion units are from Messrs. Perkins and David Brown respectively and a hydraulically operated clutch is supplied. On this model a plastic cowl surrounds the steering column and is flared to form an attachment point for the instrument panel. The second new vehicle is the first rigid type six-wheeler to be produced by Seddon. Both Kirkstall rear axles are driven by overhead worm gears. In this chassis a Perkins R6 104 hp engine is used in conjunction with a Meadows five speed gearbox.

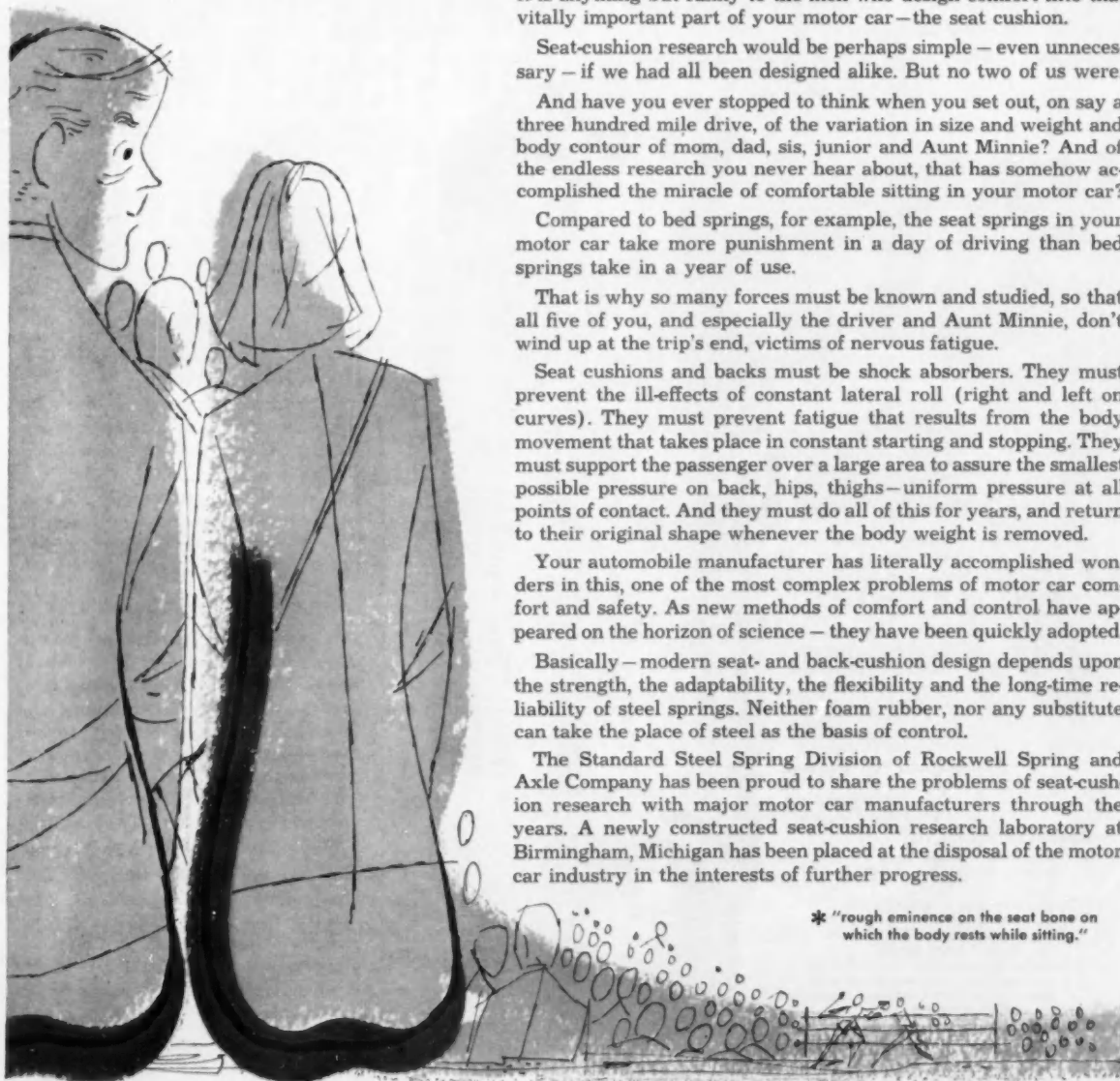
The international atmosphere at Earls Court was enhanced by the first time appearance of the Czech Tatra and Skoda vehicles and also the well known Swedish Volvo productions. In the unconventional Tatra, all six wheels are driven, and are independently sprung. Notable features are rubber suspension units and the turbo-supercharged, six cylinder Diesel units.

## WHICH PART OF YOUR ANATOMY

### IS YOUR **ISCHIAL TUBEROSITY**?

... and what difference

does it make



Yes, you have one — we all have one. And while perhaps it isn't exactly a "conversation piece" in the best circles — the particular size of your particular Ischial Tuberosity is a matter of major concern to a considerable number of men in the automobile industry.

Technically — it is described as the "rough eminence on the seat bone on which the body rests while sitting." Actually, and plainly — it is what you sit on. And while this may give you a mild chuckle, it is anything but funny to the men who design comfort into that vitally important part of your motor car — the seat cushion.

Seat-cushion research would be perhaps simple — even unnecessary — if we had all been designed alike. But no two of us were.

And have you ever stopped to think when you set out, on say a three hundred mile drive, of the variation in size and weight and body contour of mom, dad, sis, junior and Aunt Minnie? And of the endless research you never hear about, that has somehow accomplished the miracle of comfortable sitting in your motor car?

Compared to bed springs, for example, the seat springs in your motor car take more punishment in a day of driving than bed springs take in a year of use.

That is why so many forces must be known and studied, so that all five of you, and especially the driver and Aunt Minnie, don't wind up at the trip's end, victims of nervous fatigue.

Seat cushions and backs must be shock absorbers. They must prevent the ill-effects of constant lateral roll (right and left on curves). They must prevent fatigue that results from the body movement that takes place in constant starting and stopping. They must support the passenger over a large area to assure the smallest possible pressure on back, hips, thighs — uniform pressure at all points of contact. And they must do all of this for years, and return to their original shape whenever the body weight is removed.

Your automobile manufacturer has literally accomplished wonders in this, one of the most complex problems of motor car comfort and safety. As new methods of comfort and control have appeared on the horizon of science — they have been quickly adopted.

Basically — modern seat- and back-cushion design depends upon the strength, the adaptability, the flexibility and the long-time reliability of steel springs. Neither foam rubber, nor any substitute can take the place of steel as the basis of control.

The Standard Steel Spring Division of Rockwell Spring and Axle Company has been proud to share the problems of seat-cushion research with major motor car manufacturers through the years. A newly constructed seat-cushion research laboratory at Birmingham, Michigan has been placed at the disposal of the motor car industry in the interests of further progress.

\* "rough eminence on the seat bone on which the body rests while sitting."

*Serving Essential U.S. Industry with 22 plants coast to coast*

## **ROCKWELL SPRING AND AXLE COMPANY**

A CONSOLIDATION OF  
STANDARD STEEL SPRING COMPANY AND THE TIMKEN-DETROIT AXLE COMPANY

Suppliers of Automotive Seating to the Major Car Manufacturers through

Great Lakes Spring Division, Chicago, Illinois • Standard Steel Spring Divisions, Roebling, New Jersey, Los Angeles, California

# ALUMINUM AUTOMOBILE RADIATORS

—why and how soon

(Continued from page 53)

usually zinc or tin or lead.

Using this brazing process, a number of aluminum radiators, probably over a thousand, were made and service-tested during the past six or eight years or so. Generally they were of the C-T or tubular-cellular type. The tubes were lap seamed from No. 100 brazing sheet 0.010 in.

thick. This is a special double-clad aluminum sheet. As mentioned before, clad aluminum sheet designed for water tubes has a 2½ per cent zinc alloy cladding on the inside to provide protection against water corrosion. No. 100 sheet has, in addition to this inside cladding, a different cladding on the outside. It consists

of an aluminum alloy containing about 7 per cent silicon which has a melting temperature approximately 70 F below the core alloy. The purpose is to provide the filler metal for brazing exactly at the place where it is needed. The thickness of the cladding in the gages we are concerned with in radiators is 10% per side.

The fins in this brazed radiator are made of 3003 aluminum fin stock about 0.005 in. thick without any cladding. The header sheets are made of No. 100 brazing sheet. They are assembled with the core and the entire unit is preheated for 20 minutes to about 900 F and dipped in a bath of molten brazing flux at 1100 F for about one minute. This molten flux bath has a twofold purpose: (1) it heats the aluminum components to the proper brazing temperature; (2) it removes the aluminum oxide and permits the brazing metal to bond with the parent metal, that is, the tubes and fins and headers. As the brazing flux melts at about 950 F to 1000 F, the brazing alloy at 1090 F to 1140 F, the parent alloy at about 1200 F, close temperature and time control are essential.

The brazed assembly is kept for about 20 minutes at a temperature a little above the melting point of the flux to permit draining. The unit is then cooled and put through a cleaning treatment to remove all traces of flux. The flux is highly corrosive and causes trouble unless all is rinsed out.

## Radiators In Service

A considerable number of all-aluminum brazed radiators have been in service for several years. They were used in various types of waters and in all regions of the country to test the widest possible cross section of corrosive conditions. The evidence to date indicates that this type of radiator will give satisfactory service.

Why then was the brazed aluminum radiator not put in production? The answer is, in a nutshell, that there were no compelling reasons for switching from copper to aluminum, and the brazed radiator has some disadvantages at the present stage of development.

1. A major drawback is the fact that completely new plant equipment would be needed since the operations in brazing are entirely different from conventional soldering practice.

2. Very close control is required in brazing, i.e., the proper balance of time, temperature, and amount and position of the brazing alloy. A good

(Turn to page 182, please)

## Hardened and Ground Parts are our Specialty

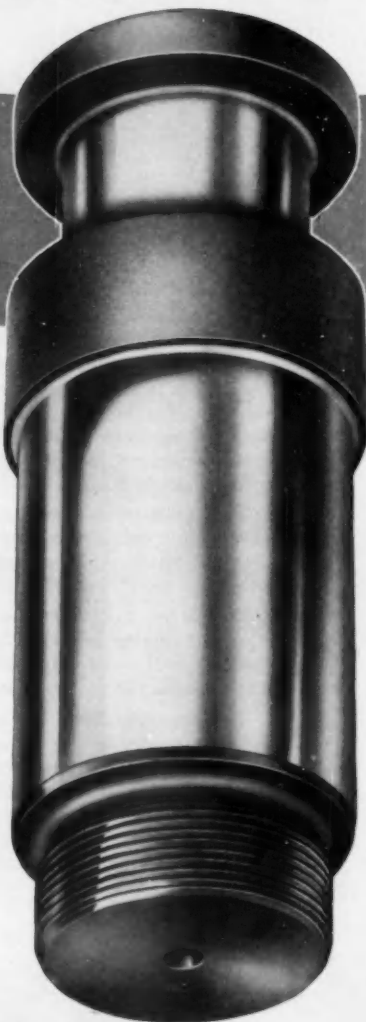
This king pin is truly king-size: 8" long and weighs about 12 lbs. We machined it out of No. 3140-27% bar steel. After heat treating, bearing surface was given the specified fine finish-grind to 2½" dia.,  $\pm .000$   $-.001$ .

Parts like this are our specialty—we've been making them exclusively for the automobile industry for more than 40 years. Each year has added to our knowledge and skill in precise machining, scientifically-controlled heat treating and micro-finish grinding. Let us show you what we can do with one of your tough jobs. Write or wire.

*Henry W. Brown*  
PRESIDENT

Experienced production on:

King Pins • Wheel Studs  
Shackle Bolts • Shackle Pins  
Brake Anchor Bolts  
Countershafts • Idler Shafts  
Stub Axle Shafts  
Steering Ball Bolts  
5th-Wheel Rocker Shafts  
Water Pump Shafts  
... anything in the hardened and ground line, of any analysis steel, up to 4¼" diameter.



# THE BROWN CORP.

213 BELLEVUE AVE.

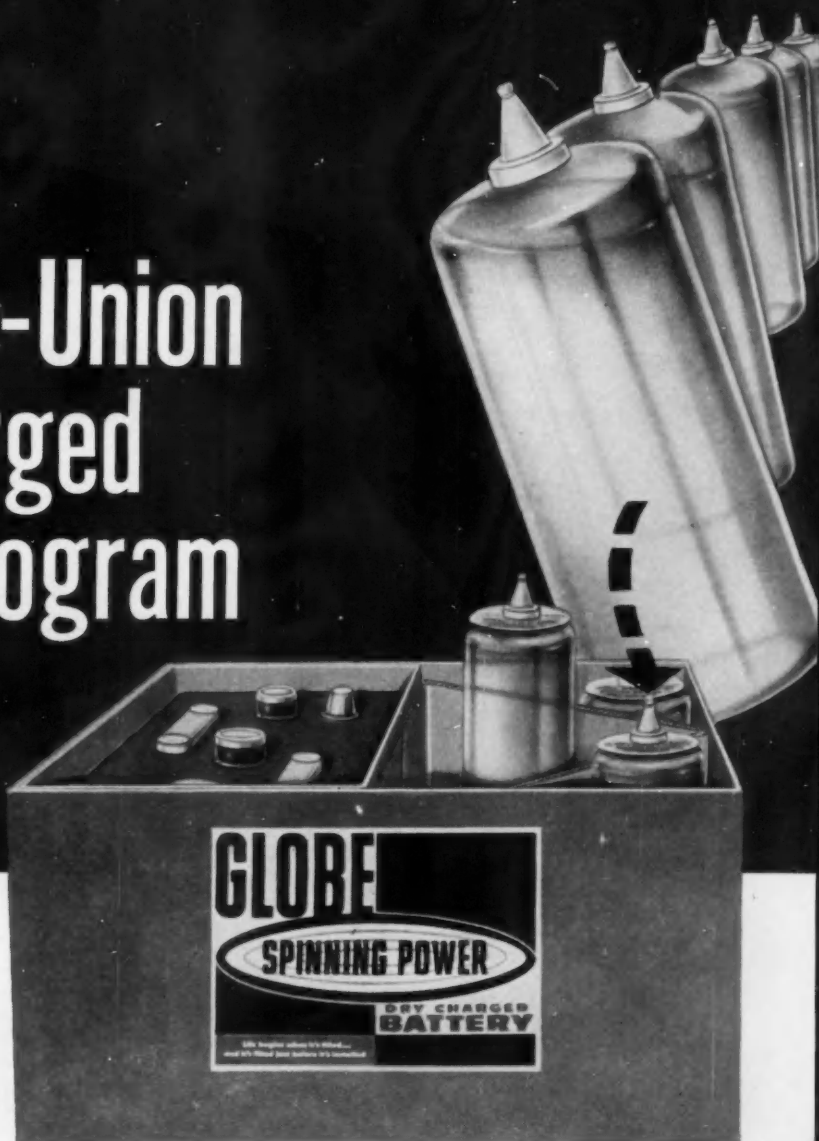
SYRACUSE, N. Y.

C. M. Ehlert, 3407 Clarendon Rd., Cleveland • N. F. Spring, 4716 Balfour Rd., Detroit • R. C. Sanderson, 2342 N. Cicero Ave., Chicago • Harry J. Windmiller, 1704 Carlton, Fort Worth • Lyle M. Johnson, 1355 Westwood Blvd., Los Angeles, Calif. • John B. Hunt, 6611 S.E. Yamhill St., Portland, Ore.

# New Globe-Union dry-charged battery program

*Gives you*

- lower shipping cost
- easier handling
- handier stocking
- safer activation
- faster delivery



## ***All this in a self-selling package!***

New ease of handling and stocking — that's what Globe dry-charged battery program extras offer you! These investment-protecting benefits are wrapped up in a single eye-catching, self-selling display carton that stacks easily... provides fast, accurate, on-the-

spot inventory control... makes it easy to set up traffic-stopping floor or window displays. Each carton is complete in itself — contains battery... lightweight, disposable electrolyte bottles... and a safety-insuring handling sleeve.



**Fast, low cost delivery!** Thirteen\* of 16 Globe battery plants are equipped for dry-charged battery production... are strategically located so that fast, low-cost shipments can be provided for all markets.

Battery plants at: \*HOUSTON, TEXAS \*MEMPHIS, TENN. \*ATLANTA, GA. \*DALLAS, TEXAS \*MEDFORD, MASS. \*MILWAUKEE, WIS. \*MINERAL RIDGE, OHIO \*PHILADELPHIA, PA. \*EMPORIA, KANSAS \*REIDSVILLE, N. C. \*SAN JOSE, CALIF. \*LOUISVILLE, KY. \*HASTINGS-ON-HUDSON, N. Y. — LOS ANGELES, CALIF. — OREGON CITY, OREGON — AJAX, (ONTARIO) CANADA



# GLOBE-UNION INC.

MILWAUKEE 1, WISCONSIN

*If it's Petroleum-powered there's a **GLOBE-BUILT BATTERY** right from the start!*

TOMORROW:

## A standard motor that can

The new ***Life-Line A*** is another step closer

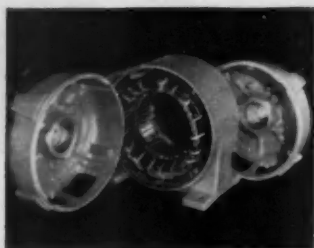
One of the principal causes of motor failure today is overloading. Right now Westinghouse is working on motor designs that will someday result in a motor that can survive any overload.

This picture shows a 15-hp Life-Line "A" motor pulling a quarter of a million pounds of locomotive on New York Central tracks near Buffalo. It's simply a dramatic way of showing the progress Westinghouse has made toward better overload protection. Improved insulation, frame construction and bearing design give the Life-Line "A" better protection against overloads than ever before. It's industry's closest approach to a standard motor that can withstand any overload condition.

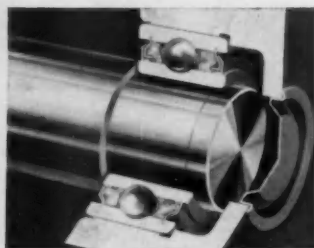
Your Westinghouse sales engineer is ready to tell you about many other reasons why the Westinghouse Life-Line "A" is industry's most advanced and preferred motor. Call him today.



J-21925



New exclusive Bondite\* impregnating varnish, partner to new Bondar\* and Mylar† insulations, guarantees complete resistance to the heating effects of heavy overloads as well as motor contaminations.

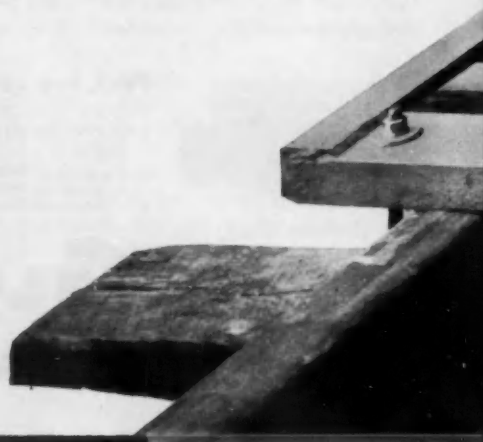


Exclusive Life-Line "A" pre-lubricated bearing features a new 4-way seal and completely excludes the three main causes of bearing failure: (1) contamination, (2) overgreasing, (3) wrong grease.

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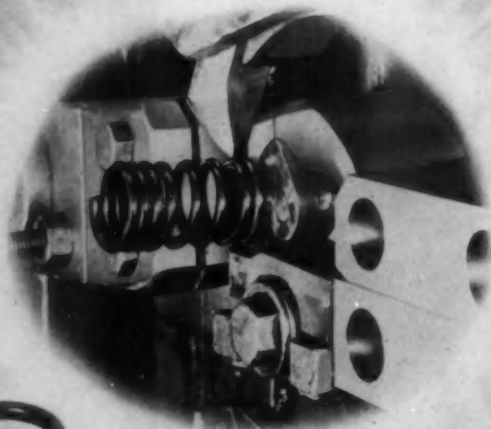
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# AUTOMATIC

SPRING COILING CO.

4048 West Thorndale Ave., Chicago 30, Ill.

## Aluminum Automobile Radiators

(Continued from page 178)

deal of experimentation is needed to establish all these factors for each radiator design.

3. A significant cost factor is the dragout and loss of the flux with each brazing cycle. At the present flux price of 40¢/lb at least \$1.00's worth of flux is lost with each radiator. How much that can be reduced on production basis is problematical and opinions differ.

4. Leakage in service presents a problem. Welding is being considered to repair leaks and so is the possibility of applying patches of a thermosetting plastic. Neither method has had extensive field tryout.

How much cheaper could this aluminum radiator be built than a copper radiator? Remember that about \$5.00 was saved on the raw material in the form of aluminum sheet and foil. A part of this \$5.00 will be used up for flux dragout, brazing fixtures, and increased labor for washing, surface treatment and other items. No one knows exactly what this extra cost amounts to. Opinions differ and until somebody decides to go into production, no data will be available. It is a safe bet, however, that eventually, on a quantity production basis, the brazed aluminum radiator could be built a good deal cheaper than a copper radiator.

## Soldered Radiator

While all this work on the brazed radiator was going on, the soldered aluminum radiator was studied again from various directions. The all-aluminum soldered radiator would of course be the ideal final solution but it's still in the future—and in the meantime a part-aluminum radiator with aluminum fins replacing copper fins and everything else left unchanged in brass—looked like an excellent half-way target.

The reasoning behind the part-aluminum radiator was of course (1) that it converts over half of the copper content of the radiator into aluminum, (2) it avoids possible complications from water corrosion in the tubes, and (3) existing soldering plants, with some modifications, can be used.

But how could the aluminum fins be soldered to the brass tubes? Since aluminum could not be soldered directly to brass by any practical



## Boyertown uses **YOLOY E** sheets to give truck body buyers more strength per pound per dollar

"More strength per pound per dollar" is the theme Boyertown Auto Body Works, Inc., uses to sell its delivery-type truck bodies. Chief contributing factor to this selling argument is the high-strength material of which the bodies are made—Youngstown Yолоy "E" Sheets.

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method known at the time, the first approach was to coat the aluminum fins with a metal that *could be* soldered, and then to use conventional solders and fluxes. This approach was explored quite aggressively during the Korean War. Aluminum fins coated with copper, zinc, nickel and other metals were tried out.

Copper, of course, looked most promising. The copper was put on by electroplating or electroless plating or roll cladding. Plating did not work out well, but the copper-clad fins worked well in soldering, although there was a little difficulty in forming. The fins had what is called a 10-80-10 pattern; that is, the aluminum core took up 80 per cent and the two copper claddings on each side took up 10 per cent of the cross section.

But a major objection to copper-clad fins was the corrosion hazard. In the 20 per cent salt spray test the aluminum between the two copper sides was severely attacked after 60 hours due to electrolytic action. Just what this test meant in terms of service life was hard to tell. Possibly a radiator built with this kind of fins with suitable surface protection might have been good for many years. But there was no time to wait and find out. The possible hazards outweighed the possible benefits and it was decided to forget about copper-coated fins.

Another approach was zinc-coated fins. A zinc coat, of course, eliminates the galvanic corrosion hazard since zinc is very close to aluminum in the electromotive series. As a matter of fact, a zinc coat would actually help to protect the aluminum instead of vice versa.

Here again plated zinc coats did not work out. Zinc-clad fins looked excellent corrosion-wise but were somewhat difficult to solder. Price-wise, zinc-cladding looked certainly a lot better than copper cladding. Nickel plated fins appeared quite promising but the nickel angle was not followed up because of the critical supply situation; and certainly the price of nickel plated fins was discouraging. Lead-tin plating did not work out well.

### Coating Possibilities

So, summing up the coating possibilities: A zinc-clad aluminum fin looks most promising. It would certainly mean a big step forward. However, even better, simpler and cheaper than a zinc-clad aluminum fin would be a bare aluminum fin

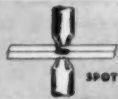
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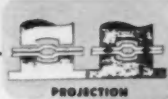
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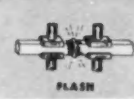
SEAM



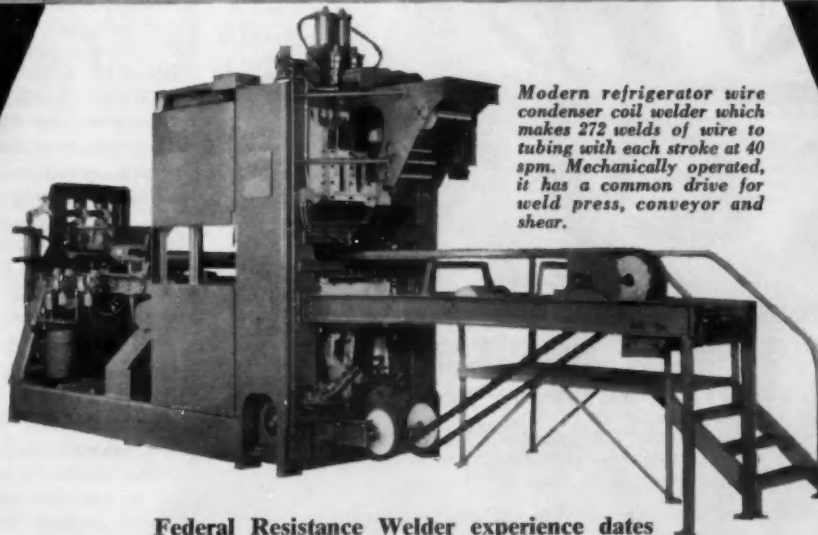
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5

without any cladding. A great deal of work has been and is being done to try to make it work.

The basic problem here was (1) to find a solder that would bond aluminum to brass and stay bonded, (2) to find a flux to go with it, and (3) to find a surface treatment that would remove any remaining corrosion hazard.

The solder—the first of these points—must have a melting point in a practical working range and good wetting ability, and above all, it must be compatible with both aluminum

and brass. That is, it must not cause excessive galvanic corrosion of any portion of the joint and, conversely, must not be excessively attacked galvanically by any part of the joint, and must have no other harmful effects such as weakening or embrittlement of the brass tubes.

To find the answer, the entire range of even remotely possible solder compositions—most of them either lead or tin or zinc base—was carefully screened. The conclusions as of today seem to be that zinc base solders will probably meet require-

ments best. Such solders are good from a corrosion standpoint and they are cheap and not in critical supply. A point against them is their high melting point which is in the neighborhood of 600 to 800 F. The best solder corrosion-wise would be pure zinc with a melting point of 780 F, or 95Zn-5Al with a melting point of 720 F. But such temperatures are too high to be practical. More practical compositions would be 70Zn-30Sn with a melting point of 590 F or zinc-cadmium solders with cadmium contents up to 40 per cent and a melting range from 600 to 700 F.

That does not mean, however, that the door should be closed on tin and lead solders. Tin-base solders would be of only limited interest because they are expensive and in critical supply. Lead-base solders, of course, would be highly desirable because of their low costs and low melting point. Unfortunately, both lead and tin are strongly cathodic to aluminum and normally will attack aluminum in presence of moisture. But sometimes surprising effects are encountered when galvanic corrosion is involved. For example, in an assembly between mild steel and aluminum, which form a cell in the presence of moisture, the aluminum, being anodic to steel, is attacked. But if stainless steel is in contact with aluminum, no attack occurs, although certainly the potential difference between aluminum and stainless is much greater than the one between aluminum and mild steel. A passivating film seems to be formed which makes it possible to assemble aluminum with stainless steel without insulation. This is mentioned merely by way of illustrating why tin and lead-base solders should not be discarded automatically because of their position in the electro-motive series. They should be, and, as a matter of fact, are being given a close scrutiny.

#### Evaluation Of Solders

The evaluation of all these solders involves a touchy subject; namely, how to run corrosion tests on the soldered joints so they will mean anything in terms of service life? There are no accepted standard corrosion tests for radiator assemblies. Every part participating in this program apparently is using its own test specimens and procedures, improving and modifying as they go along. Reynolds engineers apply two tests. The first is an immersion test in a five per cent salt solution with 0.3 per cent hydrogen peroxide added. The second is



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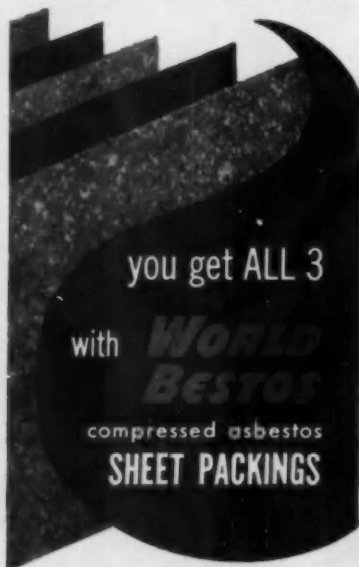


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exposure in a 100 per cent humidity chamber at 140 F. Elsewhere other concentrations of salt solutions are used, varying from 0.5 per cent to 20 per cent. Roof exposure tests are combined with periodic spraying with calcium chloride to simulate service conditions. Type and size of test specimens vary from one company to another. Certainly some kind of standardization would be of great benefit to all concerned.

But the important point is this: Assuming the specimen holds up in salt spray for four weeks, what does that mean in terms of service life? Does it mean six months, or three years, or 10 years? The answers are now beginning to come in, or at least indications of what the answers will be. The best that can be done under the circumstances is to do some guessing on the basis of corrosion and service tests available today. If any errors are committed in interpreting corrosion test data, they are probably on the conservative side.

## Flux Is Important

But the immediate problem is how to solder aluminum fins to brass tubes. The solders have been discussed. Even more important is the flux. Ideally a soldering flux for aluminum radiators should be:

(1) Liquid—for ease of application. It should preferably be a water solution or it could be applied in an organic solvent.

(2) The flux must of course be active at the soldering temperature. If zinc-base solders are used—this means the flux must be active at much higher temperatures than conventional fluxes for Pb-Sn solders.

(3) The flux should remove the aluminum oxide films to permit a metallurgical bond between the aluminum surface and the solder.

(4) The flux should react with the bare aluminum surface to deposit a layer of zinc or tin or any other metal that will accept the solder and will prevent reoxidation of the aluminum.

(5) Upon completion of the soldering action, the flux should either volatilize completely or it should leave a non-corrosive residue that is easily removable by rinsing with water.

It is very difficult to combine all these desirable properties. Obviously, none of the fluxes that are generally used for copper radiators meet the requirements. Certain aluminum fluxes that have been available for some time do meet most of the points listed except for the high tempera-

ture requirement. Other fluxes meet the high temperature requirement but depend on mechanical abrasion or rubbing to remove the aluminum oxide skin. Still other fluxes will give good wetting and soldering action but leave highly corrosive residues that are difficult to remove.

It would seem, however, that some fluxes now in the advanced testing stage will do all these things, if not 100 per cent so at least to a good practical degree. Within a year or two it is likely that several good fluxes will be available on the open market or on a license basis.

## Surface Treatment

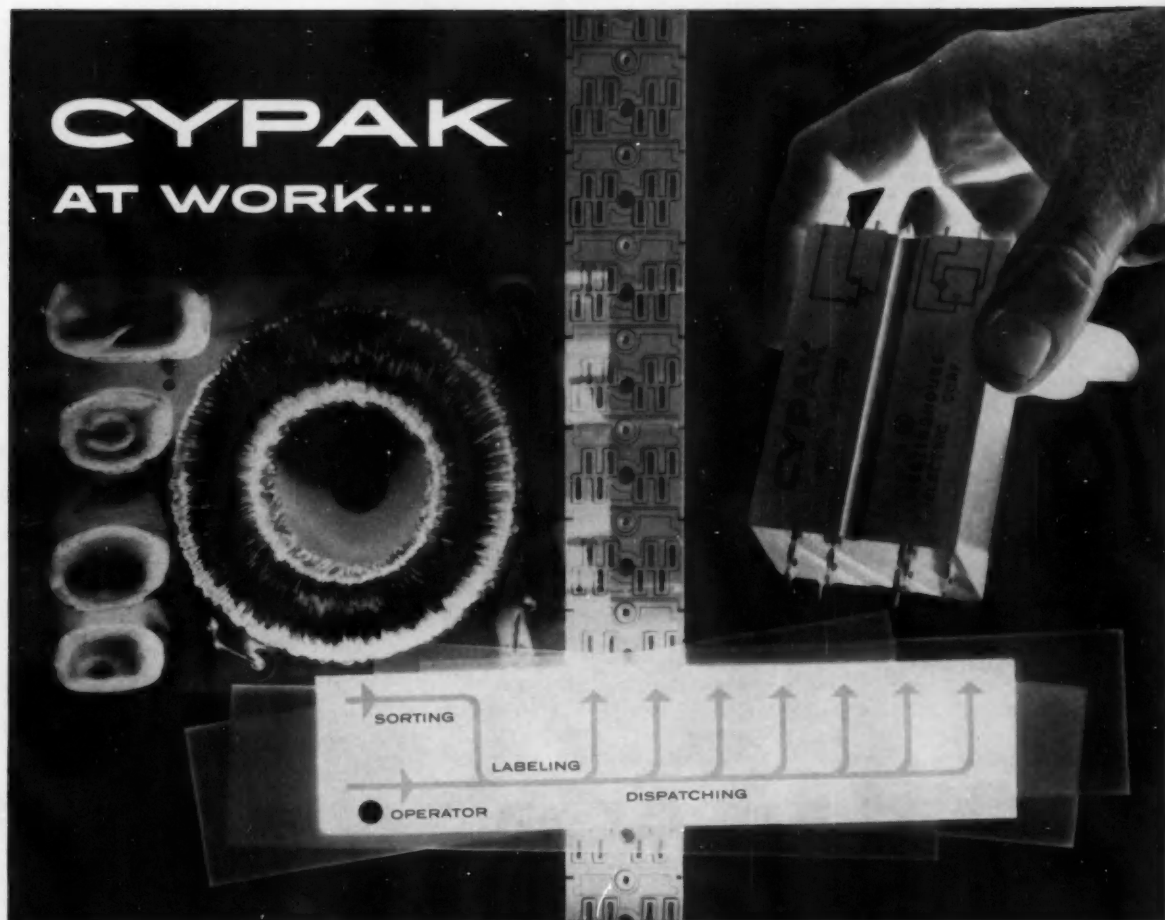
In addition to solders and fluxes, there is an important third factor—namely, the surface treatment of the soldered core assembly. The aluminum radiator can be painted or given a chemical surface treatment. Opinions on painting differ. A very good step in the right direction and perhaps the whole answer is a chemical surface treatment called Alodizing or Lithoform, or equivalents which are available from several suppliers. The treatment involves immersion in a hot dichromate or phosphate bath. It has a two-fold effect; it removes remaining surface traces of soldering flux and it improves the corrosion resistance of the aluminum fins. Some laboratory test results show an increase in corrosion life by as much as 80 per cent in brass-aluminum joints which were treated this way.

Several thousand radiators with bare aluminum fins, made with the solders, fluxes and surface treatments as just discussed, have been and are being tested. It is quite possible that radiators of this type will be in production some time next year.

## Future Of Aluminum Radiators

The soldered all-aluminum radiator, which only a few years ago was dismissed as impossible, is once again being seriously considered. Examining it today, it appears that the work that has been progressing on the brazed radiator and the soldered brass-aluminum radiator has supplied some of the answers that were missing a few years ago. Consequently, the prospects for the soldered all-aluminum radiator today are brighter than they have been for many years. Many agree that aluminum will be extensively used in automotive radiators by 1960 and possibly sooner, if we continue our present rate of progress.

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### **WATCH WESTINGHOUSE!**

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# Chevrolet Rear Wheel Bearings

(Continued from page 67)

Inner and outer races now are ground on the OD in No. 3 Micro centric Cincinnati Centerless grinders—rough and finish—using 30-in. wide wheels. Automatic feeding of a typical grinder may be seen in Figure 7. The parts have been stored in the accumulator at the left and move by gravity on the chute until they reach the horizontal feed mechanism. Here the two pairs of rollers align the parts and move them smoothly into the grinder in accordance with the cycle of the machine.

The exit end of the grinder, Figure 8, shows the simple method employed for changing the position of the part in the chute. Both inner and outer races follow the same course in different grinders and both then move to storage hoppers after washing. From the hoppers the races course down distributor chutes to an interesting probe mechanism which checks for the location of the groove on the periphery so as to align all parts automatically into proper position. At this

point there is a transfer junction: parts that come through properly aligned continue along the main chute; parts that require translation are shunted to another chute which is so arranged as to change the position of the work. All parts then enter an elevator for feeding to a battery of Heald Centri-Matic internal grinders.

Inner races are internally ground—rough and finish—in Heald grinders as seen in Figure 9. This view shows parts coming in overhead on a conveyor leading to a dribble chute which slows down the effect of the abrupt gravity drop. In addition, the upper end of the dribble chute is fitted with a load relieving device which limits the number of pieces fed at any time, thus relieving the automatic feed within the grinder of any heavy loading. Finished races come off the Heald by means of the chute in the foreground and pass automatically through the Sheffield gaging station.

Outer races are handled in similar

fashion. It may be noted at this point that although none of the grinders have a feedback from the Sheffield gaging equipment, the gages are so arranged that if two consecutive pieces are rejected, the gage will automatically shut down the machine.

Races now are ready for ball race grinding. Following the preceding operations, they go through a washer, then take their course to hoppers feeding the next operation.

Inner races, which have the ball race on the OD, proceed to a battery of Cincinnati grinders fitted with a suitable formed wheel. Figure 10 is a close-up of one of these machines, showing the vertical slow-down chute leading to the inclined chute which directs parts into the grinder. Finished parts come out on the chute in the foreground, go through the Sheffield gaging station, accepted parts going directly to hot wash.

Outer races, which have the ball race in the bore, are ground in special internal grinders designed and built here. Figure 11 is a close up of one of these machines. Parts are fed to the machine from the vertical dribble chute at the right, into the gravity chute leading to the work station. Parts come out on the curved chute in the foreground and are gaged automatically with a three-point probe at the Sheffield station. Noteworthy feature of the ND-made grinders is the provision for automatic feedback in the event that two consecutive parts fail to meet acceptance. This is accomplished by the mechanism which may be seen at the extreme left.

Parts then move to a hot wash, and are transported by chute to a Sheffield master gaging machine which simultaneously checks all dimensions.

Outer races move from here to an accumulator where they are held ready for final assembly. Inner races, however, are treated differently. Since all of the critical finish grinding is on the periphery, it is necessary to protect the ground surfaces. To this end, inner races are routed to a group of Leading Engineering vertical type storage cabinets which have a continuous spiral track and are held here until ready for distribution to assembly.

In view of the detail involved in the assembly process, a description of the final stages will be held over for the second installment to follow in an early issue. At the same time we shall also include some highlights of the new method of producing bearing balls for this assembly in a fully integrated department.

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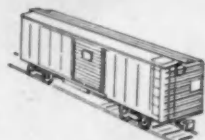
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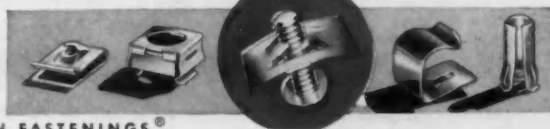
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This means high production welding and dependability from industry's most advanced resistance welding control, now 30 percent lighter in weight than the old design.

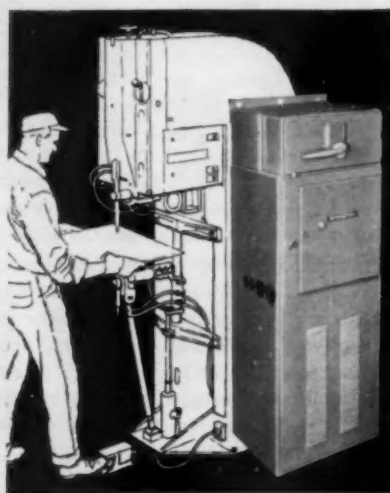
For all the facts, call your Westinghouse sales engineer. Or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Penna.

J-21936

\*Trade-Mark

## **WATCH WESTINGHOUSE!**

**WHERE BIG THINGS ARE HAPPENING TODAY!**

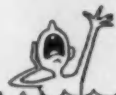


Everything about this new resistance welding control is designed for high production, product and personnel protection and longer lived dependability.

**STAINLESS and TOOL STEELS  
HIGH-TEMPERATURE ALLOYS  
and OTHER STEELS**



## **A-L HOT EXTRUSIONS (solid and hollow) may solve problems for you**



**Help!**

(Dept. AL-82)

We have a parts problem that hot extrusions might solve. Let's see an AL representative for facts and figures.

- ☐ STAINLESS STEEL
- ☐ TOOL STEEL
- ☐ HIGH TEMPERATURE STEEL
- ☐ OTHER STEELS

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Where can these leading advantages of hot-extruded special alloy steels apply to your production?

1. Hot extrusions require very little finishing before use, even in the case of involved shapes. The scrap loss is small and you can buy raw materials closer to finish size. You buy less high-cost steel, cut away less of it . . . save both in time and material cost.

2. The range of shapes, solid or hollow, which can be hot-extruded is almost infinite. They can be easily and quickly produced in any quantity. Dies for new or experimental parts cost little and can be made up fast.

• We're ready to serve your needs with hot extrusions in any grade of stainless or high temperature steel, many tool steel grades and other steels. Call us in to help. *Allegheny Ludlum Steel Corporation, Oliver Building., Pittsburgh 22, Pennsylvania.*

**Leading Producer-High Alloy Steels**

**Allegheny Ludlum**



WED 8518

# ***Stronger! Lighter!***

**ALWAYS  
SPECIFY**

**GUNITE**

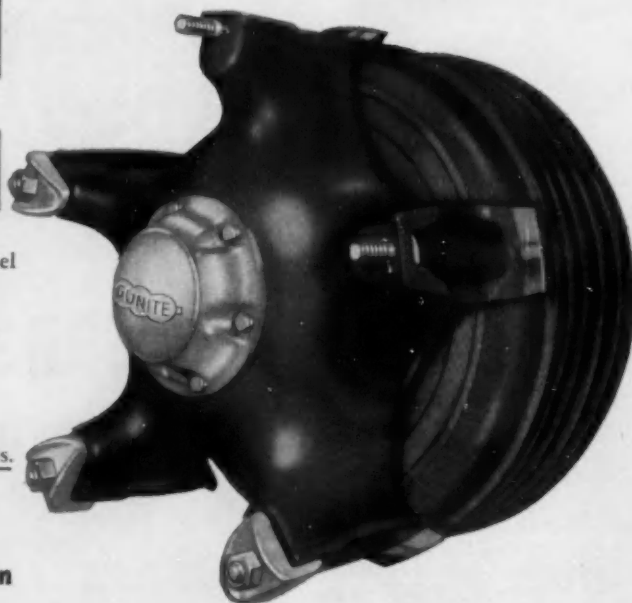
## **CAST-STEEL WHEELS**



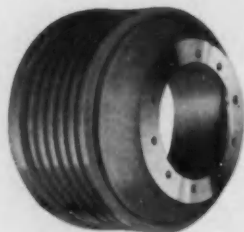
**FOR NEW EQUIPMENT**

**FOR CHANGEOVERS**

Many leading fleet engineers specify Gunitite Cast-Steel Wheels on all their heavy trucks and trailers . . . for good reason too! Gunitite wheels are rugged . . . yet lightweight. Minimum unsprung weight increases payload . . . increases income. Compare weight with other wheels. Save with Gunitite! Gunitite wheels fit both tubeless and conventional tires.



**Call Your Gunitite Distributor  
or Write for Complete Information**



**GUNITE BRAKE DRUMS for Trucks, Trailers and Buses**

Gunitite Drums offer you more miles of safe, sure stops. Ribbed design minimizes flexing, dissipates heat faster and resists checking. Write for information or see your Gunitite Distributor.

# **GUNITE**

**FOUNDRIES  
CORPORATION**  
*Established 1854*

**ROCKFORD, ILLINOIS**



# Designers' Guide for Selection of Hose Lines



EXCELLENT



GOOD



CONDITIONAL



UNSATISFACTORY



This hose selector chart plus other engineering data is included in Aeroquip Catalog No. 200. Write for your copy today.

TYPE OF FLUID	AEROQUIP HOSE NUMBER	AEROQUIP HOSE NUMBER																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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(Neop.)	1535	1536	1537	1538	1539	1540	1541	1542	1543	1544	1545	1546	1547	1548	1549	1550	1551	1552	1553	1554	1555	1556	1557	1558	1559	1560	1561	1562	1563	1564	1565	1566	1567	1568	1569	1570	1571	1572	1573	1574	1575	1576	1577	1578	1579	1580	1581	1582	1583	1584	1585	1586	1587	1588	1589	1590	1591	1592	1593	1594	1595	1596	1597	1598	1599	1600	1601	1602	1603	1604	1605	1606	1607	1608	1609	1610	1611	1612	1613	1614	1615	1616	1617	1618	1619	1620	1621	1622	1623	1624	1625	1626	1627	1628	1629	1630	1631	1632	1633	1634	1635	1636	1637	1638	1639	1640	1641	1642	1643	1644	1645	1646	1647	1648	1649	1650	1651	1652	1653	1654	1655	1656	1657	1658	1659	1660	1661	1662	1663	1664	1665	1666	1667	1668	1669	1670	1671	1672	1673	1674	1675	1676	1677	1678	1679	1680	1681	1682	1683	1684	1685	1686	1687	1688	1689	1690	1691	1692	1693	1694	1695	1696	1697	1698	1699	1700	1701	1702	1703	1704	1705	1706	1707	1708	1709	1710	1711	1712	1713	1714	1715	1716	1717	1718	1719	1720	1721	1722	1723	1724	1725	1726	1727	1728	1729	1730	1731	1732	1733	1734	1735	1736	1737	1738	1739	1740	1741	1742	1743	1744	1745	1746	1747	1748	1749	1750	1751	1752	1753	1754	1755	1756	1757	1758	1759	1760	1761	1762	1763	1764	1765	1766	1767	1768	1769	1770	1771	1772	1773	1774	1775	1776	1777	1778	1779	1780	1781	1782	1783	1784	1785	1786	1787	1788	1789	1790	1791	1792	1793	1794	1795	1796	1797	1798	1799	1800	1801	1802	1803	1804	1805	1806	1807	1808	1809	1810	1811	1812	1813	1814	1815	1816	1817	1818	1819	1820	1821	1822	1823	1824	1825	1826	1827	1828	1829	1830	1831	1832	1833	1834	1835	1836	1837	1838	1839	1840	1841	1842	1843	1844	1845	1846	1847	1848	1849	1850	1851	1852	1853	1854	1855	1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	25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*Engineered  
Stampings*



## Put this stamping team to work for you

This battery of 195-ton Open Back Inclinable presses is only part of Ackermann-Wheeling's stamping team. Other presses range from 10 to 1,500 tons.

This complete stamping team, including facilities for deep drawing, shearing, spot and arc

welding, brazing, pressing, degreasing and painting, stands ready to solve *your* problem.

Find out now how efficiently and economically *your* product can be mass-produced, assembled and shipped, all from one dependable source. Write, wire or call for full details.

## ACKERMANN MANUFACTURING COMPANY

WHEELING, WEST VIRGINIA

STEEL STAMPING DOES IT BETTER....



ACKERMANN-WHEELING DOES IT BEST!

### Cut your handling costs with Ackermann **BAND-BOX** Steel Shipping Container

It's the ideal solution to in-plant and inter-plant shipping and storing. Rugged, all-steel construction, yet light weight to save on shipping costs. 15 nested boxes occupy cubic area of 1 assembled box. Nestable parts assemble in seconds. Self-palletizing. Engineered to specific requirements. Call, write or wire for full details on the Ackermann Band-Box.





## The drafting stage—not later— is the time to design-in oil seals!

Oil seals are precision products. They are designed to operate under a specific set of conditions. Change just one of those conditions—lubricant, shaft speed, temperature, even bearing position—and a different seal will almost always be needed.

Why chance costly retooling or remanufacture? Specify the correct seal on the drawing-board. And

when you do, get all the information there is on new seals, new lip compounds, and mechanical designs. Get it from your National Oil Seal Engineer. His counsel is complete, up-to-the-minute, and accurate. You couldn't buy better oil seal information, yet his help is yours for the asking.

Why "do it yourself?" Call the nearest National Oil Seal Engineer now.

### **NATIONAL MOTOR BEARING CO., INC.**

Plants at Van Wert, Ohio, Redwood City, Downey and Long Beach, California  
General Offices at Redwood City



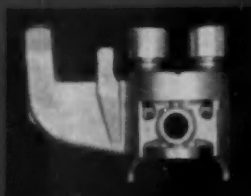
CHICAGO, ILL. . . Room 462, McCormick Building, HArrison 7-5163  
CLEVELAND, OHIO . 210 Heights Rockefeller Bldg., YEllowstone 2-2720  
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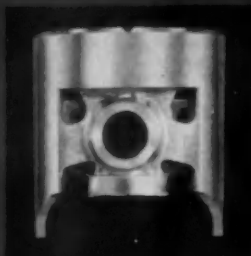
# La Salle dial-inline-automatic

## New Automated Piston Line

*a dial type  
machine and  
an in-line type  
machine combined  
to form a  
single fully  
automatic unit!*



PERMANENT MOLD



MACHINED PISTON

### fully automated 14-station unit

The pistons, as they come from the mold, are fed, on conveyor, directly to this new unit. They pass thru 5 stations in the "Dial Type" section, and 9 stations in the "In-Line Type" section of the machine. And, the pistons are never slid, rolled or bumped.

### series of operations performed

It mills off the gates and risers; pierces the wrist pin hole, and the window around the wrist pin hole; hollow mills the piston OD; faces the piston head; faces, and chamfers the skirt of the piston; weighs, and gages each piston; and, rejects pistons found to be over size, over weight, under size or under weight.

### produces 400 pistons per hour

Furthermore, this unit will handle, any one of 3 different pistons, merely by changing the position of the selector switch, and the fixture locaters.

### maximum flexibility for model changes

The shuttle mechanism can be adjusted for different size and shaped pistons, which automatically allows for future parts design changes.

### unitized construction

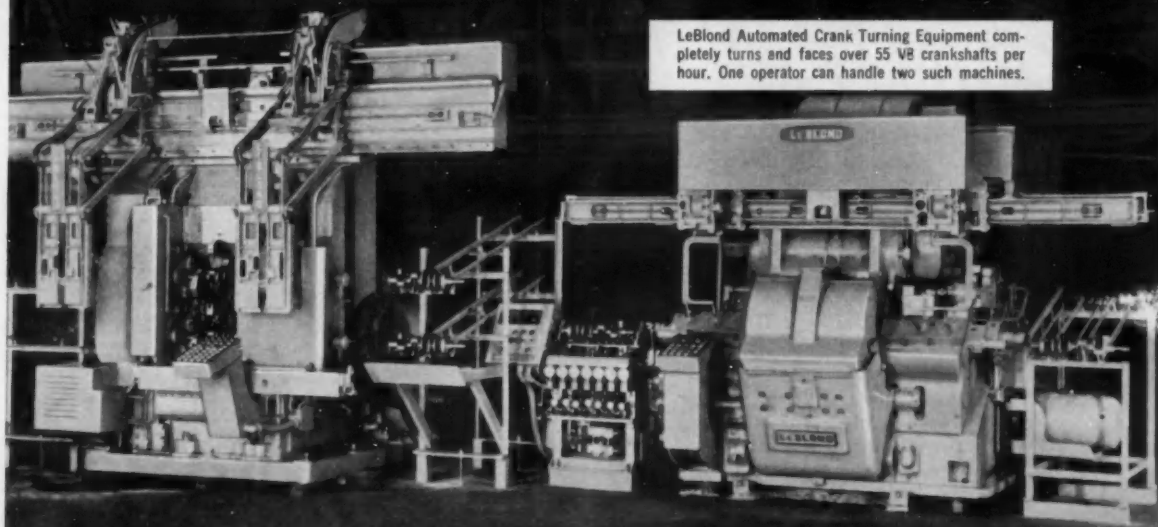
It's built to J.I.C. Hydraulic and Electrical standards. There's automatic lubrication throughout. And, there is a chip conveyor provided in the base of the unit.

**La Salle** *tool, inc.* ENGINEERING & BUILDING  
SPECIAL MACHINERY

3840 EAST OUTER DRIVE • DETROIT 34, MICHIGAN

ANOTHER EXAMPLE OF

# VICKERS® Hydraulics



LeBlond Automated Crank Turning Equipment completely turns and faces over 55 V8 crankshafts per hour. One operator can handle two such machines.

## in AUTOMATION

This new LeBlond Automated Crank Turning Equipment machines crankshafts at an exceptionally high rate. All operations of the Models LBA and PBA machines shown above are hydraulic with the exception of the actual rotation of the crank . . . here a Vickers hydraulic motor is used for braking and jogging the electric motor drive. All hydraulic power is supplied by Vickers Pumps and controlled by Vickers Valves.

In addition to the advantages inherent in hydraulic control, Vickers Hydraulics gives you the benefits of a nation-wide and full-time field engineering and service organization to assure correct application and operation with least maintenance. Vickers has the complete line of

hydraulic equipment necessary to take undivided system responsibility . . . to eliminate any risk of incompatibility of hydraulic components.

The Vickers Application Engineer near you will be glad to demonstrate the many benefits you can obtain by using Vickers Hydraulics. Write for a copy of Catalog 5001A.

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DIVISION OF SPERRY RAND CORPORATION

ADMINISTRATIVE and ENGINEERING CENTER  
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7301

### Representative Standard VICKERS Units Used on LeBlond Automated Crankshaft Lathes



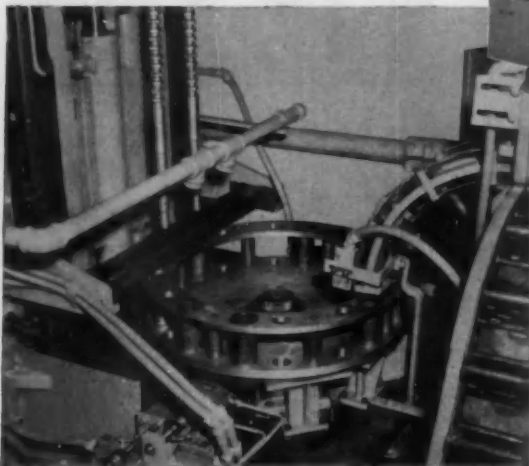
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

# POSITIVE BROACHING CONTROL!

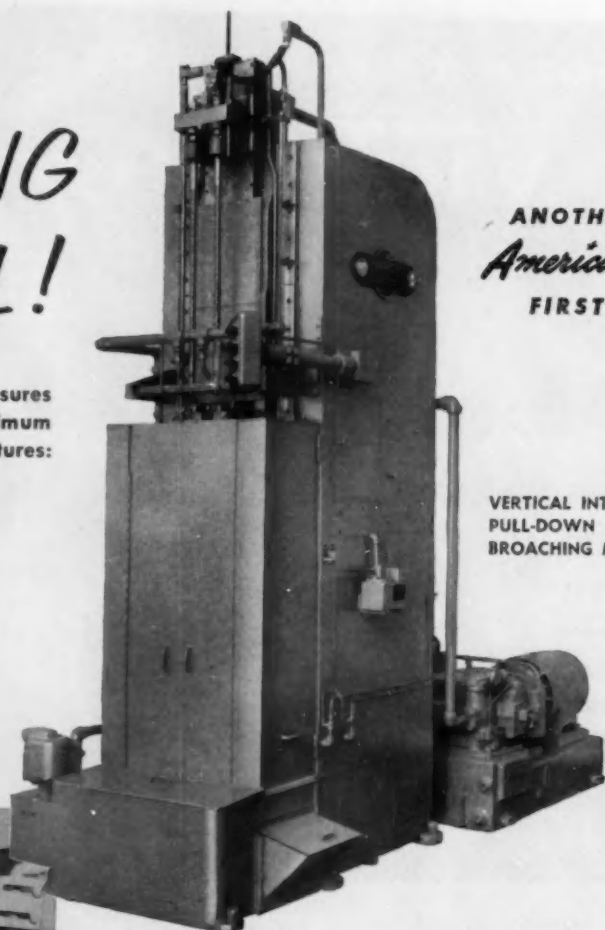
This NEW American Pull-Down Machine assures high production internal broaching and maximum machine efficiency by these positive control features:

**\*NEW** retriever unit is built integral with a massive machine slide — provides continuous, rigid broach support through the major portion of the broaching stroke.

**\*NEW** chip-free, radially-locked puller design—insures that broaches are locked securely in position before the machine cycle can continue.



The NEW American Vertical Internal Pull-Down Broaching Machine is completely electrically controlled, with all elements interlocked for maximum tooling safety and machine efficiency. High speed production at constantly maintained tolerances becomes a fact through American "Engineered Production."



ANOTHER  
*American*  
FIRST

VERTICAL INTERNAL  
PULL-DOWN  
BROACHING MACHINE

## AUTOMATION FLEXIBILITY

Illustrated at the left, the NEW American Pull-Down Machine is tooled for full automation of parts from the floor to the dial-index unit pictured, and on through broaching position to final parts ejection back to the production line. Such automatic components can be added initially or later as individual production requirements demand, and without the usual high cost of special engineering.



Write today to see how American can solve your internal broaching problem. Ask for Catalog No. 800.



**American** BROACH & MACHINE CO.  
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

See *American First* — for the Best in Broaching Tools, Broaching Machines, Special Machinery





When you demand high uniform quality,  
you use Bonderite under the paint.



#### SEAL WITH A MEANING

The red and silver Bonderite seal on your products will tell buyers, "This Product Will Look Better Longer," 25 years of national advertising backs up this seal. Write to find out how you can cash in on it.

● When you see the smooth, tight-grained, uniform Bonderite coating move past the inspection station, you know your final paint film will be smooth, even and lustrous.

There's another point to mention here. As production men know, when inspection finds high uniform quality on the paint line, there'll be mighty few field refinishing costs to bite into profits.

High uniform quality is just one of the advantages Bonderite delivers. Let us tell you the rest of the story. Write or call today.

\*Bonderite, Bonderlube, Parco, Parco Lubrite, Parker Pre-Namel—Reg. U.S. Pat. Off.

**PARKER RUST PROOF COMPANY**  
2178 E. MILWAUKEE, DETROIT 11, MICHIGAN

**BONDERITE**  
corrosion resistant  
paint base \*

**BONDERITE and BONDERLUBE**  
aids in cold forming  
of metals

**PARCO COMPOUND**  
rust resistant

**PARCO LUBRITE**  
wear resistant for friction  
surfaces

**TROPICAL**  
heavy duty maintenance  
paints since 1883



AUTOMOTIVE INDUSTRIES, October 15, 1956

201

*See what adhesives are doing today!*



## Setting safer paths for little feet



America's school buses carry especially precious cargo. That's why their designers and manufacturers place great emphasis on all details pertaining to passenger safety. Safe, non-slip flooring is one of the essentials.

To anchor floor matting to the steel floors of their school buses—and to keep it anchored, smooth and "trip-free"—many bus manufacturers have standardized on a 3M rubber-based adhesive. They chose it for safer floors . . . and because they need fast application and a quick, strong, lasting bond that will stand up under vibration, tempera-

ture changes and strong cleaning solutions.

### **See what adhesives can do for you . . .**

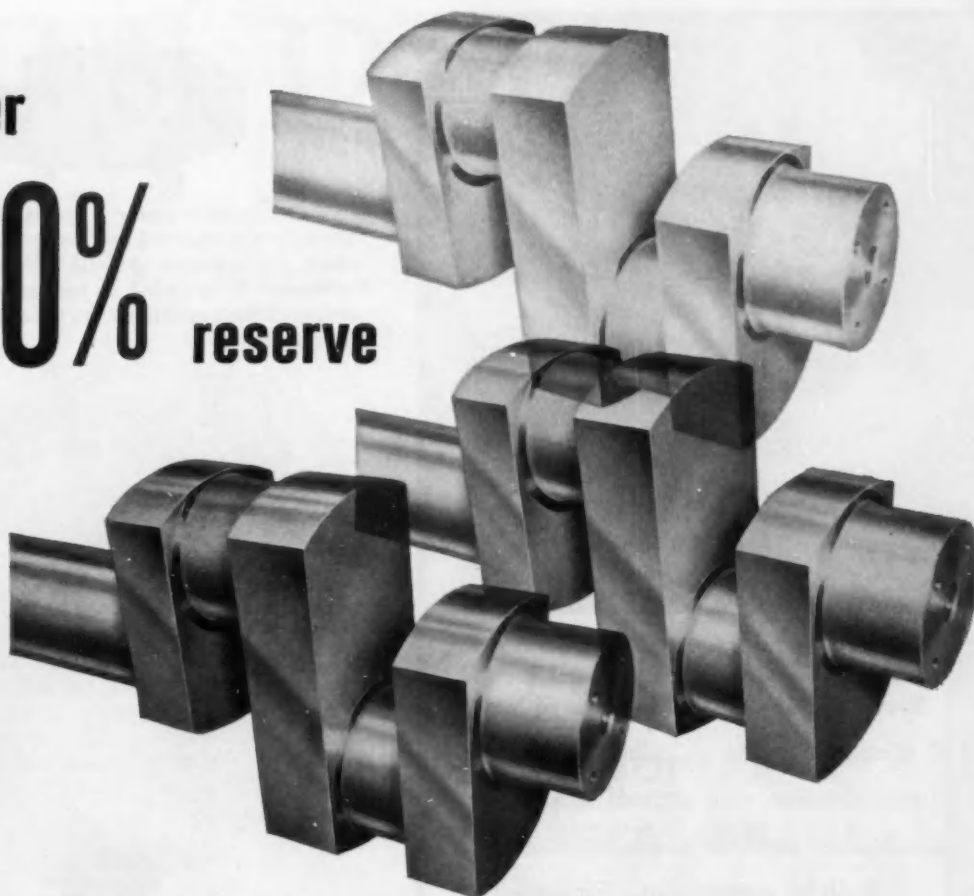
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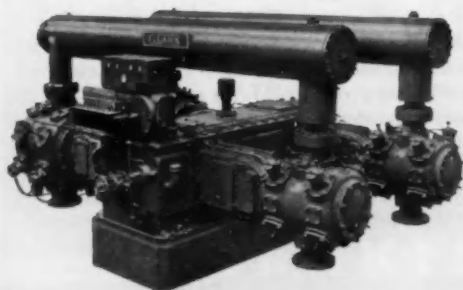
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*auto parts*

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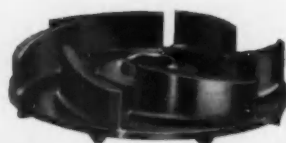
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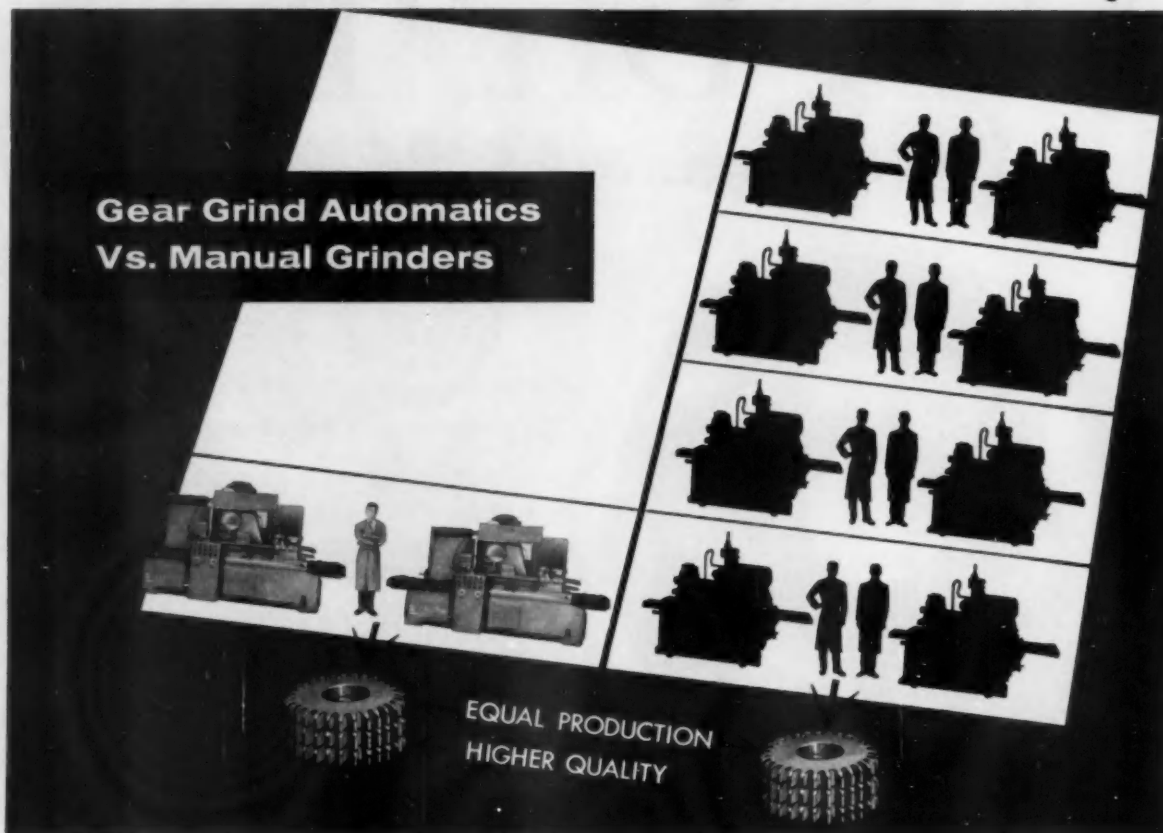
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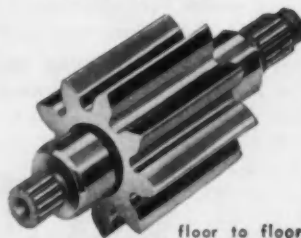
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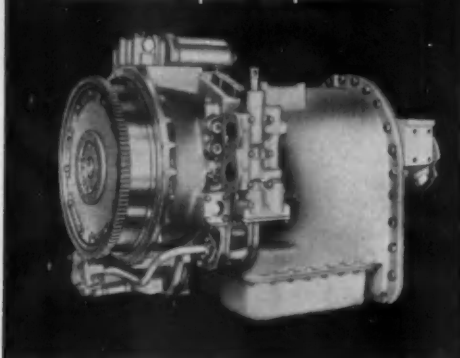
costs down to the minimum. The TORQMATIC converter absorbs shock loads, prevents harmful engine lugging and stalling.

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Want to know more about this great new Allison Model CBT-5640 FourSpeed TORQMATIC DRIVE? Write Allison Division of General Motors, Box 894A, Indianapolis 6, Indiana.



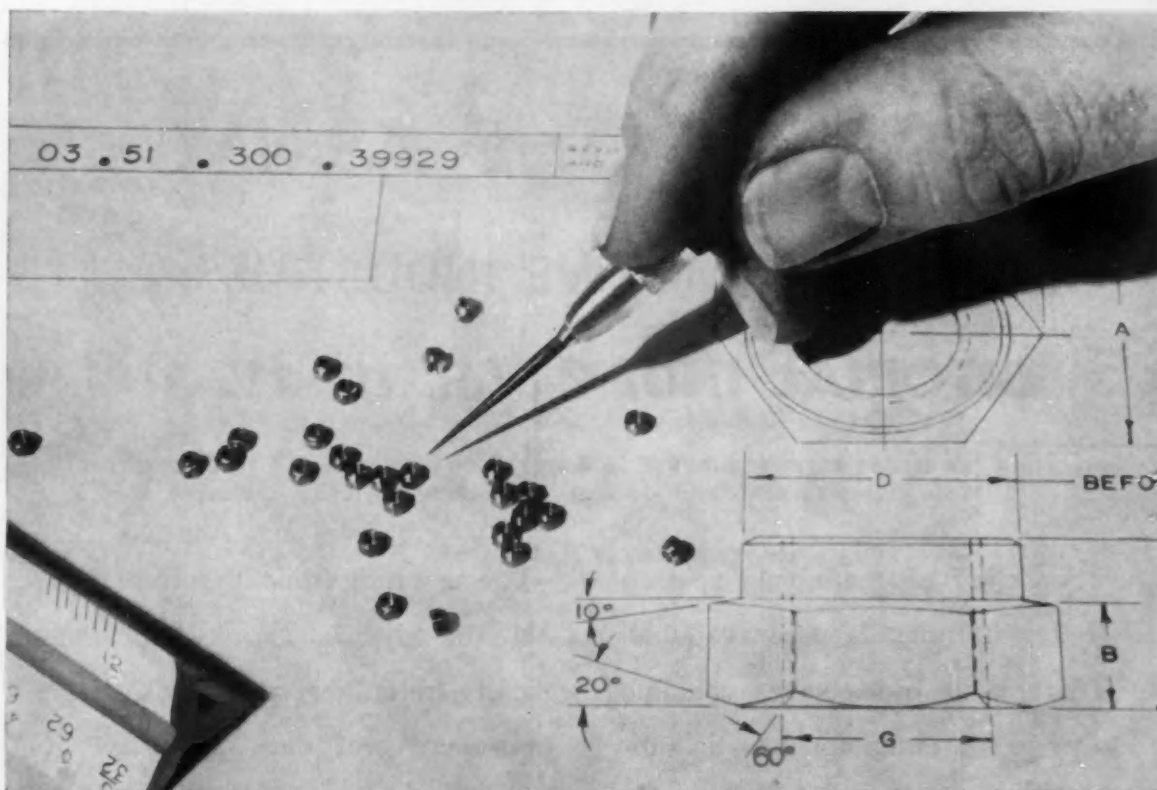
Allison Four Speed Torqmatic Drive



*Allison*



**TORQMATIC DRIVES**



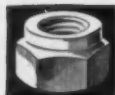
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1-64 NC-3B	.127	.123	.0635	.0585	.141	.090
1-72 NF-3B	.127	.123	.0635	.0585	.141	.090
2-56 NC-3B	.158	.153	.068	.063	.176	.105
2-64 NF-3B	.158	.153	.068	.063	.176	.105
3-48 NC-3B	.190	.183	.071	.066	.210	.120
3-56 NF-3B	.190	.183	.071	.066	.210	.120
4-40 NC-3B	.190	.183	.072	.067	.210	.120
4-48 NF-3B	.190	.183	.072	.067	.210	.120

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covering the issues from January 1 to June 15 and from July 1 to December 15, 1955, inclusive and from January 1 to June 15, 1956, inclusive

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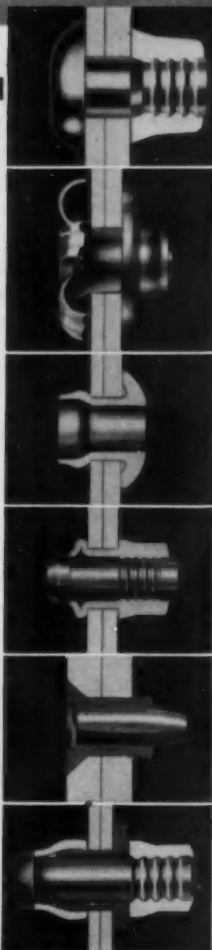
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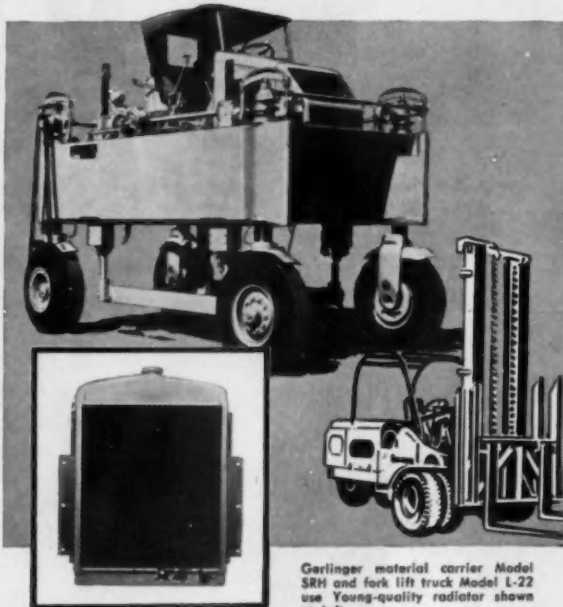
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cool the engines that power the "muscles" of Gerlinger weight lifters and carriers



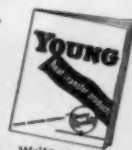
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Solving heat transfer problems is what we do best because it is our very reason for being. You, too, can harness the power of Young engineering talent. Write, wire or call without obligation.



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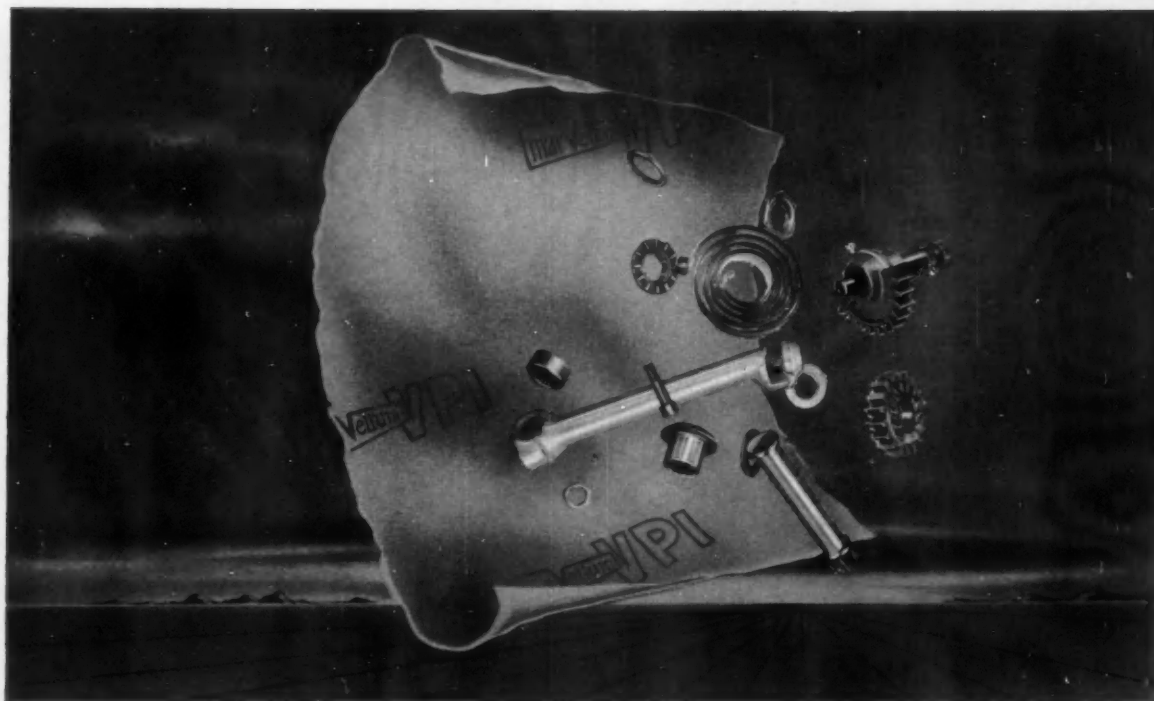
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60%. A small strip (2" x 2 1/4") of Marvellum VPI will protect a critical electronic switch for 1/10¢; machinery and heavy equipment valued in the thousands can be shrouded with Marvellum VPI for as little as \$1.00.

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**Brake Shoe**

**AMERICAN BRAKEBLOK DIVISION**  
DETROIT 9, MICHIGAN

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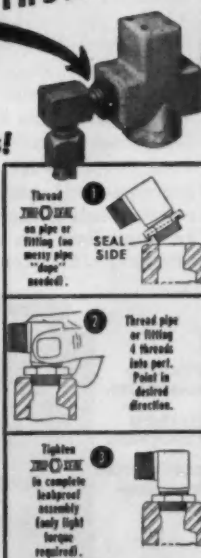
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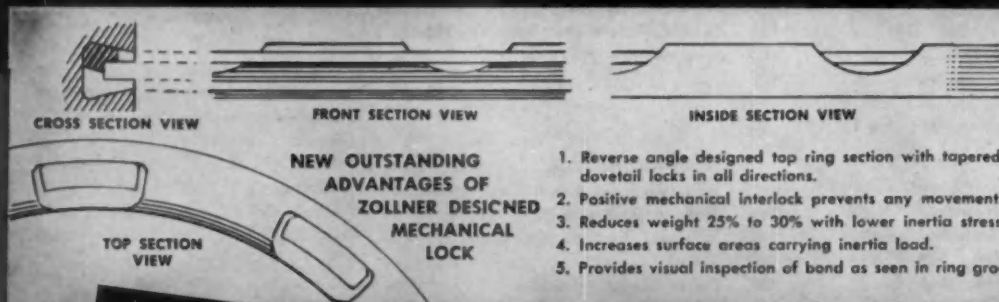
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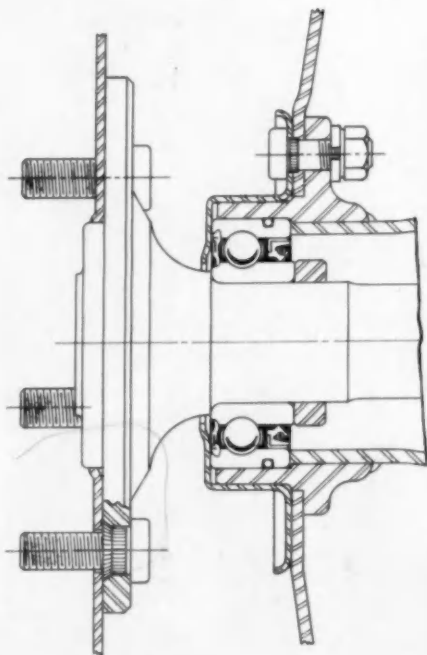
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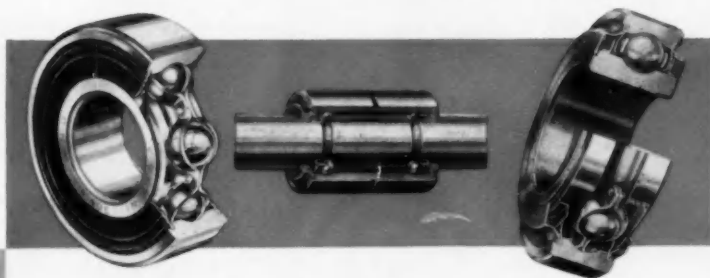
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